The Builder.

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Civil Engineering College for India.

AN apt illustration of our recent article on the "Education of the Civil Engineer in this Country," appeared a proposal for the establishment, or rather the modification, of a College for the education of Civil Engineers for the Service of the Indian Government, under the auspices of the India Office. It is perhaps but little known that for the last twelve years a college has been established at Cooper's Hill, Surrey, for this purpose. Admission has been gained by a competitive examination on technical subjects; the object of the course being to recruit the college from students already possessed of the rudiments of mechanical knowledge. Notwithstanding the considerable inducements offered by the Indian Public Works Department to attract competent men to its service, this college has hitherto proved a failure. We cannot but think that this must, to some extent, be owing to the want of due publicity. Few persons, we are assured, can have been aware of the existence of an institution which opened a definite means of admission into a service that gave occupation, in the year 1869, to 896 officers, of whom 533 were civilians; and in which the salaries rise from 300*l.* per annum for third grade assistant engineers, to 3,000*l.* per annum for chief engineers of the first class. The head of the department is the Public Works Secretary of India, whose salary is 4,200*l.* per annum. The expenditure which it is estimated that this department will have to superintend in the year 1870-71 amounts to nearly 7½ millions sterling. Of this 1,230,000*l.* are devoted to State railways; 1,300,000*l.* to roads and miscellaneous public works; 2,400,000*l.* to irrigation works; and 700,000*l.* to civil buildings. Yet not only has there been no competition for the appointments to the college, but the number of students who have succeeded in passing a very low qualifying examination has been below the number of vacancies. In 1869, out of forty appointments offered for competition, no less than twenty-seven lapsed!

The conclusion being thus arrived at "that the present state of scientific education in the country does not afford the needful means of supplying direct to the Indian Government a sufficient number of qualified persons who are able to undergo an educational test of reasonable strictness," a new system has been decided upon. Admission is to be obtained by competitive examination, to which all British-born subjects, between seventeen and twenty-one years of age, who can produce satisfactory testimonials of good moral character, are eligible. The course will extend over three years, subject to diminution on proof of competent knowledge in the requisite subjects being already possessed. And all the students who pass satisfactorily through the course will be appointed to the Indian Public Works Department as assistant engineers, second grade, with a salary of 420*l.* per annum, and provided with a free passage to India.

The full publication of these advantageous terms, conjoined with the belief that the management of the Public Works Department is to be improved, ought to produce abundance of competitors for the fifty scholarships. The payment to be made for each student is 150*l.* per annum, in instalments of 50*l.* for each of the three terms into which the year is divided. We conclude that the entire expense of the student, including his clothes, or at least a college uniform, will be defrayed by the college, in consideration of this payment; but this is not stated. It is intended that at least two out of the three terms shall be passed by the student under a civil or mechanical engineer, whose fees will be defrayed by the college. The pupil will receive an allowance of five shillings a day for lodging money and provisions, while thus absent from the college.

The subjects assigned for the entrance examination are mathematics, pure and mixed, natural and experimental science, and classics, each of which branches takes 2,000 marks; English composition, history, and literature, 1,000 marks; French and German, 750 marks each; mechanical and free-hand drawing, 500 marks each. For more minute details we refer to the prospectus issued by the India Office.

The appearance of the prospectus of the new college renders it important to take a comprehensive glance at the various establishments actually existing in this country in which it is proposed to give special education to young men destined for the profession of engineer, whether civil, mechanical, or marine. We have from time to time given accounts of what is doing in our Art and Science Schools. The organisation of industrial education, as a whole, is a subject which has never even been seriously contemplated in this country. In all that has hitherto been attempted in connexion with the establishment at South Kensington, applied art has been regarded as the ultimate object. Pure art, cultivated for its noblest aims, is beyond the scope of the Committee of Council on Education. Leaving out of question, then, this highest *desideratum* in the plan of any truly national culture, it is yet possible to design a general educational course, of which the teaching now given by the schools of art and science shall form a part, but which shall comprise the industrial training of the members of the principal handicrafts. The smith, for instance, to the practice of the forge and of the anvil, should add the knowledge of the elements of mechanics, of metallurgy, of chemistry, and of the principles of design, before he is in a condition rightly to avail himself of instruction as to ornamental hammer-work. In our recent exhibitions of modern smith-work the absence of some such guidance is painfully evident.

The distinct branches of our various skilled industries group around, and culminate in, the functions of the engineer, civil and mechanical. Metal work, from the forging of a nail or the shoeing of a horse, to the tempering of a watch-spring or the hammer work of a steel coffer or cabinet; woodwork, from the mitreing of a frame to the carving of an altar-screen; stone-work, from the quarry to the studio; textile work, from the spinning-wheel to the ribbon-loom; ceramic work, from the tile to the statuette,—all involve the practice of certain great constructive laws, which form the basis of the science and practice of the engineer. In the provision, then, which is made for the thorough education of this central workman we may find a measure of the probable outcome of our industrial skill in coming years.

As compared with the Continent, the provision for this normal industrial training may almost be said to be *nil*. The Royal School of Mines, and the Royal School of Naval Architecture and Marine Engineering, at South Kensington, are the only English institutions distinctly designed for giving special education of this nature, apart from one military establishment.

In the former of these there were, during the session 1868-9, 17 students entering for one, two, or three years, with a view to become associates, and 93 occasional students entering for special subjects. In the Naval School there were in all 40 students. Such is the lamentable state of our special schools.

In the minor universities there has been an attempt to establish chairs, or faculties, of civil engineering. No provision appears to have been made for associating these lectureships with the Institution of Civil Engineers, or for obtaining the support and aid of the leaders of the profession. Each of the classes thus formed appears to be abandoned to the private guidance of the professor; and the various inaugural lectures and signed reports of some of those gentlemen display strange instances of aberration and crotchet. One professor distinguishes himself by the advice "avoid Euclid as pestiferous," while, on the other hand, he "does not attach much importance" to the workshop as a means of education. Reliance on the most unpractical of all teaching, namely, lectures, is the characteristic of these classes. The Department of Applied Sciences at King's College, is intended for manufacturers as well as for engineers, and only desires to "form an appropriate introduction" to practical instruction. The Department of Civil and Mechanical Engineering at University College, London, is intended as an introduction to a regular pupilage. At the University of Edinburgh a course of a year less than in the two London colleges is supposed to qualify the attendant for a degree of Bachelor or Licentiate of Engineering, as to the conferring of which legal difficulties exist. In Glasgow University a "certificate of proficiency in engineering science" is granted at the close of two sessions. It is recommended that "*if possible*, the elementary parts of mathematics should form part of the preliminary education" of the student who is to attain, in so short a time, a certificated proficiency. The Royal College of Science, Dublin, affords a more serious course of three years' study, the third being specialised under the branches of mining, agriculture, engineering, and manufactures. Twenty-eight students only have availed themselves of this college in the past year. The education may be ranked with that given by the School of Mines and the School of Naval Architecture, before referred to, and the weakest part of the case is the small number of students. The three years' course of civil engineering in Queen's College, Cork, is also intended to be completed before the student enters an office. There is a three years' course of civil and mechanical engineering at Owen's College, Manchester, which is also intended as preliminary to articles of pupilage. Trinity College, Dublin professes, in a three years' course, to "furnish all the information, practical as well as theoretical," necessary to fit for practice.

It is evident that, whatever be the professed character of the two or three years' course which, in King's College, University College, Glasgow University, Queen's College, Cork, and Owen's College, Manchester, is intended to prepare for pupilage, and which, in Edinburgh and in Trinity College, is thought sufficient to render unnecessary any practical grounding in the profession, none of these establishments can be considered as ranking so high as the *École Polytechnique* in France, or the corresponding institutions in other parts of Europe. Moreover, while the *École Polytechnique* demands for its entrance a

rate of proficiency probably high enough to obtain the "diploma" of any of these newly established departments, the three years' course of that excellent establishment is only preparatory to a further term of three years spent in one of the more advanced and special schools of engineering, of which we have no counterparts in this country.

We fear that the attention at present given to our various industrial, scientific, and artistic schools will avail but little to place the English workman on the level now generally attained by his Continental rival, in the absence of any serious attempt to provide for a really superior course of education in industry, art, and science.

Apropos of the state of our technical and professional education, two illustrations have been brought before us, in consequence of our recent remarks on this important subject. One of these was an incident arising from that grievous national calamity, the loss of the *Captain*, a subject which has brought into evidence, in so striking a degree, the unacquaintance of our public writers with the simplest elements of mechanics. That this defect is not peculiar to members of the literary profession may be learned from this astounding fact, one so discreditable that we are only induced to give it publicity from the high official authority on which we received it. A civil engineer of eminence,—of course, names are better avoided,—wrote to a Government department on the subject of the disaster. He remarked that a good deal had been said as to the centre of gravity of the *Captain*, but that the fact was that NO HOLLOW BODIES COULD HAVE ANY CENTRE OF GRAVITY!

The second anecdote we give on the authority of a man well known to all familiar with engineering matters. Under the advice of this gentleman, a young man went to one of the colleges which we have above mentioned, and passed creditably through the three years' course. He then, under the same advice, was articled to a marine engineer, and served a five years' apprenticeship, during which he did his best to carry on his college education. At the expiration of his articles, still following the advice of our informant, he went to Zurich, with the intention of passing through the superior course of technical education there to be obtained. On making proper inquiries after his arrival, he found, as he wrote to inform our friend, that if he did his best for eight months with a private tutor, he thought that he should be able to get through the pass-examination *into* the college! Here we have, first, college course, and then practical study, leading short of the threshold of the Swiss college, and yet we find an Edinburgh professor proposing to turn out the article ready made in three years by means of university lectures!

It seems to us that, especially considering that the acquisition of the Hindostanee language is to form an obligatory part of the college course, the term of three years proposed for the India College is inadequate to meet the requirements of the case. Nor do we think that the breaking up of the year into three terms is advisable. Considering the slackness which invariably characterises the beginning of a term, and the time consumed by examination at the close, we think that half-yearly terms are by far the most advantageous. The examination at the close of each term should be a real test of the pupil's ability and industry. The marks thus earned should be carried to his permanent credit, so that his final position should represent the merit and conduct of his entire collegiate life, and not depend, as at Oxford and Cambridge, on cram and a spurt at the last. The combination of a practical acquaintance with the duties of the office, the field, and the workshop, with an adequate college course, will be attended with the utmost benefit to the student. Here, indeed, as in the course itself, the time allowed is too short. It must be remembered that far more will be thrown on the civil engineer in India than is the case in this country, and that it is of far more importance that he should be fully prepared to discharge the important functions to which he may there be called than in circumstances where, in case of need, he may readily have recourse to adequate aid. A five years' course, including a year and a half of actual practice, seems to us the minimum which is worth the name of collegiate tuition. In this case, the last three terms, or the year and a half after returning to the college, might very advantageously be specialised. Mechanical construction, architectural construction, marine construction, forestry, mining, and metallurgy, are so many separate branches of the duty of the engineer. To attain full and equal proficiency in each would require a longer time than we have indicated, unless the scale of attainment at entering the college were something much higher than we can at present hope to be the case. It would, therefore, be far better for the public service if the division of the engineering staff under these several heads were made early enough to allow of a special prosecution of the selected branch of study.

On one point, it is hardly necessary to add, the success or failure of the India College, will mainly depend. We mean the selection of the tutors. We shall not be accused of any want of professional *esprit de corps* when we say, do not let the tutors be merely engineers. Let them be men specially educated for tuition,—men like the examiners for Woolwich, and not engineers without practice, who therefore call themselves professors. The glance which we have given at existing institutions should be conclusive on this point. Those of our readers who are most familiar with the subject will remember, without more distinct citation on our part, reports and incidents of more than one recent Government Commission which tell the same tale. Important investigations, which ought to have borne valuable practical fruit, have come to a most ignominious close from the incapacity of what should have been the informing element of the entire machinery. Railway management in England and in Ireland, irrigation, sewage, river maintenance,—all these are subjects as to which there has been, within the last few years, more or less effort to settle the main principles; attempts as yet resulting in nothing worthy of the actual science of the day. That such will continue to be the case so long as political schemes have precedence given to them over scientific questions we fear we must expect. It is the more requisite that incompetent men should not be allowed to come to the fore as the representatives of a profession on the exercise of which, in its military and civil branches, the safety, wealth, and prosperity of the country so intimately depend.

We speak at once with the more earnestness and the more confidence from the fact that we suppose that we are regarding, not a private speculation, but a *bonâ fide* administrative effort to supply a great national want. Under this view of the case it is more than probable that the arrangements now proposed are the best for the moment, and that they may be regarded to a considerable extent as temporary. Thus, according to the prospectus, the fifty highest competitors in 1871 are assured of studentships, however low may be the positive qualification of the competitors. If hundreds of engineers are now urgently required, this may be all very well. Better fifty partially educated men for 1874 than none. But this must be, as soon as possible, amended. In the same way the length of the course and the specialisation of the pursuits in the later terms, as above suggested, may be matter for subsequent amendment. The question of the choice of tutors is vital. We trust that, in any arrangement, the special qualifications of which the Royal Engineers have at present (most unfortunately) almost a monopoly, will not be lost sight of; and that some highly-educated member or members of this distinguished corps will be associated with the direction of the course of study. As to the practical part, we suggest that the Council of the Institution of Civil Engineers should be brought into official correspondence with the College; and that it will not be the men who offer the most tempting terms for the allocation of a pupil, but the most eminent and the busiest engineers, engine-builders, and naval architects, into whose establishments the India College will obtain admission for their students. With these essential conditions fulfilled, we shall realise from this college an important benefit for our great Indian empire. We shall offer a distinct career to talent, industry, and merit, and we shall do for our Eastern dominions that which we ought to take shame and confusion to ourselves for not having hitherto even seriously attempted for our insular home, provided an adequate school for the civil engineers; and associated with the attainment of a proper education, and the formation of a reliable character, the certain entrance on professional duty.

We have seen with regret that some professors of two or three institutions, which include in their programme a course of introduction, in the lecture-room, to the practical instruction of the engineer, have not thought it derogatory to their position to protest before the Government against the establishment of a thorough system of engineering education. Of the animus and good taste of such a proceeding the public will form their own opinion. We had hoped that we had survived the time when any persons should claim a vested right in maintaining the ignorance of others. For the conductors of an educational course, which bears about the same relation to the training which we ought to give, and which other countries do give, to the civil engineer, that a dame school bears to Eton or Rugby, to object to an effort to fill up a great gap in our public institutions, is not a matter which will much concern the Indian Government. What does concern them is that the education which they offer shall be so sound, extensive, and thorough, and that the inducements which they offer to the best men to devote themselves to the hardships of an Indian exile shall be so unmistakable, that in our Indian College, as at Woolwich, we may be able to submit without shame to a fair comparison with the great Continental schools.

RAILWAY DEVELOPMENT.—BOARD OF TRADE RETURNS.

The railway returns compiled in the statistical department of the Board of Trade, and published annually, were formerly moved for in the House of Commons, and a form was prescribed in which the particulars, in regard to traffic especially, were to be set forth. The formality of moving for the returns is no longer necessary, their compilation and production being now an ordinary official duty on the part of the railway department of the Board of Trade. For several years past there have been great complaints, not without cause, on account of the delay that has occurred in the publication of the returns, which frequently appeared so long after date as to be comparatively worthless. The returns for the year 1868, for instance, did not appear till the third quarter of 1870. The returns for 1869, now published, make way for those of 1870, which may be expected to appear in a few months. The returns, as now published, are altered in order, and modified in various particulars. The section relating to accidents is omitted, full particulars concerning these being given in another return and reports of the Board. The new form embraces, 1. Share and loan capital of each railway in the United Kingdom; 2. Traffic in passengers, goods, minerals, &c.; and, 3. Return of working expenditure, rolling stock, &c. Live stock should not have been dropped, we think, from the traffic returns.

It may reasonably be expected that, with the statutory powers now available by the Board of Trade for the collection of the statistics of railways, particularly as regards share and loan capital, the next returns will be much more complete than those now issued. The blank schedules issued to the companies are suggestive, almost exhaustive; but the thought and care bestowed in the divisions of the schedule, and in the sub-divisions and headings are thrown away if the columns are to be published blank in the returns. The columns should be altered or reduced in number as occasion may require, so as to embrace the information that the companies are now under legal obligation to supply. A reliable return, complete as far as its range goes, would then be secured. The particulars hitherto asked for from the companies by the Board of Trade have been,—Authorised capital—by shares, loans, total. Stock and share capital received—ordinary, average rate per cent. of dividend, guaranteed, guaranteed rate of dividend, rate of dividend paid, preferential, preferential rate of dividend, rate of dividend paid, total stock and share capital received. Capital raised by loan and debenture stock—loans, rate of interest, debenture stock, rate of interest, total raised by loans and by debenture stock. Total stock and share capital received and capital raised by loans and debenture stock; and, subscriptions to other companies. A less diffuse form would probably be more satisfactory, and would avoid the wildernesses of blank spaces now presented by the pages of the return.

The first part of the return enumerates 413 railway companies in England and Wales, including 98 which have leased their lines, 68 that have not sent any information or accounts, 5 whose powers have expired, and 4 that have applied to abandon. Forty-six Scottish companies are enumerated, including 27 whose lines

are leased, and 1 that has sent "no information." Ireland has 76 companies, including 19 whose lines are leased, 9 that have sent no information or accounts, and 3 that have applied to abandon. An enumeration of the 78 companies that have sent no information or accounts, of the 5 whose powers have expired, and of the 7 that have applied to abandon, would not be worth the space it would occupy. Of the 90 companies against whose names the columns are blank, there is only one belonging to Scotland, whose black sheep is the Caithness Company, which can have no information to give, as to traffic or working expenditure, not having broken ground, but must have a capital account, inasmuch as it is incorporated, and is applying, we notice, for another Bill this session.

The following is an abstract of the returns of capital at December 31st, 1869:—

	Authorised Capital Total.	Stock and Share Capital Received.	Capital raised by Loans and Debentures.	Total.	Subscriptions to other Companies.
England and Wales	£504,553,394	£317,312,502	£113,560,266	£430,772,858	£12,323,116
Scotland	71,886,041	44,689,072	16,442,788	61,131,860	1,714,092
Ireland	32,828,218	20,644,129	6,230,914	26,875,043	268,076
	£609,267,653	£382,645,703	£136,233,968	£518,779,761	£14,305,284

It is natural that any one interested in this return should revert, for purposes of comparison, to the returns of the preceding year. In doing so he will make a startling discovery that will induce further scrutiny and bring him to the conclusion that the official document from which the above figures are quoted contains so many errors and omissions as to render it almost entirely valueless. It matters little that care should be bestowed upon the divisions and subdivisions of the return if those whose business it is are incapable or indifferent as to the proper manipulation of the figures supplied to them. The return exhibits the extraordinary statement, —it does not disclose the *fact*,—that the authorised capital of the railways of the United Kingdom was more by 6,177,965*l.* at the end of 1868 than it was at the end of 1869! The returns show also that on Irish railways there was a *decrease* for 1869, as compared with 1868, of 263,960*l.* in the paid-up capital; of 468,934*l.* in stock, share, and loan capital subscribed; and of 126,724*l.* in subscriptions to other companies! An increase in the miles open is shown as concerning England and Wales, but Scotland curiously shows 42 miles less for 1869 than for 1868, and yet we have heard of no mountain floods or earthquakes that have swept away or buried any of the Scottish railways. But these errors of omission are bagatelles compared to those made in relation to goods traffic. The returns published three months since gave the goods and minerals carried by the railways of the United Kingdom as 126,621,006 tons; the returns now published give the quantity as 27,571,109 tons: a falling-off, if the figures had any value, of no less than 99,049,897 tons! It is shown, however, that for carrying about a fifth of the quantity the companies received 638,767*l.* more money! These returns would be interesting in themselves, if they could be relied upon, but much more so if given in comparison with former periods. The passenger traffic and miles run by trains appear to be stated with at least approximate accuracy, and a few comparative statements may be given in connexion with these.

Going back for two decades, we find the following to be among the facts:—In 1849 there were 6,032 miles open; passengers conveyed, exclusive of season-ticket holders, 68,841,539; in 1859 there were 10,002 miles open, and 149,757,294 passengers conveyed; in 1869 there were 15,145 miles open, and 305,668,071 passengers conveyed. The receipts for passenger traffic in the three years respectively were 6,277,892*l.*, 12,537,493*l.*, and 18,811,504*l.*; that is, the passengers carried have been more than quadrupled, and the receipts more than trebled, in the twenty years. The receipts from goods traffic at the same periods have been 5,528,606*l.* in 1849, 13,206,009*l.* in 1859, and 22,263,817*l.* in 1869. Receipts from all sources at the three periods respectively, 11,806,498*l.*, 25,743,502*l.*, and 42,695,927*l.*

Reverting, for comparative purposes, to a more recent year than 1859, say to 1862, we find the following to be the facts:—

Passenger Traffic, United Kingdom:—

	1st Class.	2nd Class.	3rd Class.	Total.
1862	23,105,351	51,809,239	105,454,181	180,429,071
1869	26,818,307	65,655,088	176,300,245	268,774,280
			Not classified	36,893,791
				305,668,071

The proportions of first, second, and third class passengers, in England and Wales, and in Ireland, are in the proportions, speaking roughly, of one, two, and three, in the three classes. In Scotland the second-class passengers, instead of being more than double the number of the first class, as in England, or nearly double as in Ireland, are absolutely lowest in number of the three classes, the figures being, first-class 2,872,705, second-class 2,403,764, and third-class 18,187,308.

The receipts from season ticketholders constitute an important item in the passenger traffic. In 1862 the number of season and periodical tickets was put down at 13,359; in 1869, at 96,214. This return, however, is manifestly seriously defective, inasmuch as the numbers of season tickets issued by six or eight companies in England and Wales are not given, including three companies that do very large season-ticket traffics. It is under the mark to add at least 20,000 to the season and periodical tickets, as will be seen presently, when some of the omissions are stated. Assuming that 20,000 should be added to the return for the omissions, it brings the season tickets up to 116,214 for the United Kingdom; and assuming that each season ticket is used 150 times, this would give 17,432,100 journeys to be added to the single ticket passengers, or 323,000,171 passengers carried in 1869 by railway, or more than ten trips in the year for every man, woman, and child in the United Kingdom. Lines having stations in the metropolis have, as may be supposed, the far greater part of this traffic. Nine out of ten of the periodical tickets are taken by business men, and some by women also, we can add from personal knowledge, who travel daily from their homes in the suburbs in the morning to their places of business in town, and back again in the evening. Many such tickets are used also for going home to dinner; and in the case of the South-Eastern Company are also available, and are freely used, for passing between Cannon-street and Charing-cross. The blanks in the following statement indicate some of the omissions of season and periodical tickets in the return to which reference has been made above:—

	No. of tickets issued in 1869.		Receipts from tickets issued, in 1869.
South-Eastern	...	...	£79,018
Brighton	...	...	79,585
South-Western	8,651	...	71,096
North-Western	11,299	...	53,465
Great Eastern	4,899	...	41,735
Great Western	4,300	...	31,773
London, Chatham, & Dover	8,563	...	30,374
Great Northern	8,261	...	27,559
Midland	...	...	26,314

The three companies left blank for the numbers are not the only omissions.

The season-ticket business is not confined to the metropolis: some of the lines having stations in the large provincial cities and towns also cultivate residential traffic, as is apparent from the following:—

	No.		Receipts.
Lancashire and Yorkshire	8,487	.....	£52,949
North Eastern	4,923	.....	27,678
Manchester, Sheffield, and Lincolnshire	1,814	.....	9,142
Bristol and Exeter	434	.....	3,449
Blyth and Tyne	306	.....	751

For Scotland, the following are amongst the figures for season-tickets issued in 1869, and receipts therefrom:—

	No.		Receipts.
North British	6,918	.....	£21,344
Caledonian	6,671	.....	18,010
Glasgow and South Western	1,188	.....	7,964
Great North of Scotland	4,332	.....	4,209
Highland	1,143	.....	2,296

For Ireland,—

Dublin, Wicklow, and Wexford	4,094	.....	£13,831
Belfast, Holyhead, and Bangor	3,685	.....	3,706
Cork, Blackrock, and Passage	...	.....	1,041

As regards train miles run, the returns are as follows for the two years:—

	Passenger Miles.	Goods Miles.	Total Miles.
1862	57,542,831	56,518,966	108,061,797
1869	81,073,231	76,291,296	157,533,255*

* Including 167,728 miles not classified.

The miles run by trains is a number too vast to be apprehended, and it can be but little help to the understanding to say that 157 millions of miles are more than 6,000 times the circumference of the globe!

The total receipts from all sources were,—29,128,558*l.* in 1862, on 11,551 miles, against total receipts of 42,695,927*l.* in 1869, upon 15,145 miles; the working expenditure was 49 per cent. of the gross receipts in both years.

As regards rolling stock, the increase has been very great in recent years. In 1849, the number of locomotives upon the lines of the United Kingdom was stated at 1,965; the following are the figures for the years 1862 and 1869:—

	Locomotives.	Passenger Carriages.	Wagons.	Miscellaneous.	Total.
1862	5,140	12,584	153,569	9,161	180,474
1869	9,109	20,653	244,876	15,418	290,056

Like the mileage run by trains, the engines, carriages, and wagons that do the running, are more easily numbered than measured by the imagination. If they were buckled close up, the engines would give a noble vanguard to the monster train, that would extend over 60 miles; the grand army of passenger-carriages, wagons, and miscellaneous following would extend over more than 1,000 miles.

In 1848, the number of officers and *employés* of all kinds, employed upon the 4,253 miles of railway then open for traffic, was 52,687. In 1865, with 13,289 miles open, Mr. W. F. Mills gives the number then employed at 166,047. On a moderate estimate, the industrial brigade which manages and works our railway system may be put down as now numbering at least 190,000 men, whose essentially important and valuable services to the community are rarely appreciated,—never overrated.

ON THE PROTECTION OF DWELLING-HOUSES FROM SOLAR HEAT.

A TINY pamphlet has lately reached us from Italy, in which various simple methods of "*Protecting Dwelling-houses and the Human Frame from the Effects of Solar Heat*"* are discussed by Professor F. Orioli, of Bologna. As the subject —the first portion of it especially—is much neglected by English residents in hot climates, a few extracts may, perhaps, be serviceable to builders and occupiers of dwellings thus situated.

"It is notorious," writes the Professor, "that with all the care and study which have been devoted to the question of providing artificially against the effects of cold, the application of similar measures to temper the effects of extreme heat has been altogether overlooked." He adds, that as he has no intricate machines nor costly devices to propose, he foresees that his remarks will not be regarded as of much weight; still the defect is so little creditable to the national knowledge of *savoir vivre*, that he desires to do his share towards remedying it.

After briefly noticing the palpable defects of Italian domestic architecture in the present day—flimsy, unshaded walls which absorb the heat from the adjacent soil, and transmit it to the interior of the building, despite the liberal application of whitening to their exterior, small confined rooms which have taken the place of the ample *salons* of a bygone age; numerous closely-set windows, which, in place of light, admit heat in summer and are a source of cold in winter; a confused medley of fanciful styles in glaring contrast with the noble Palladian models of the past,—he proceeds to consider the remedies readily available for some of these defects; and, first, as regards

Window Blinds.

Under this head the professor includes "the wooden gratings known as *jalousies*, believed to have been first introduced by the Saracens in Spain; inside-blinds of all kinds; wooden and other shutters applied to the inside of windows, and window-hangings, white and coloured, of all descriptions." In respect of the first, he observes that, when designed, as they usually are, for the exclusion of heat, the worst form which can be given them is with the "laths" ranged transversely, so as to admit of a view of the street or of the opposite houses, the reflected rays from the surfaces of which pass through the intervals to the interior of the apartment. With the best made jalousies this will occur to a certain extent. In some, the apertures are so

* "L'Arte di Preservare dai Calori Estivi le Abitazione e le Persone." By Professor Orioli. Bologna. 1870.

wide as to defeat the object for which they are designed altogether. This defect may be remedied by movable laths; but, he adds, and the remark is applicable to a good many hot localities besides Italy, good workmanship cannot always be secured; and even where it can, the effects of the sun on the laths causes the blinds speedily to get out of working order. He recommends that the laths should be fixed upside down, with a sufficient overlap to preclude the possibility of any rays being reflected between them. One or more movable laths might be left in the middle, to prevent a total exclusion of the view. A movable blind, projecting verandah-fashion from the architrave in addition to the jalousies, would not only intercept rain and the direct rays of the sun from passing through the interstices of the former, but would also provide against the rays of heat reflected from the surface of passing clouds, which rays are frequently very troublesome. Inside blinds, although they cannot be regarded as absolutely useless, have little real effect upon the temperature of the room. If made of too thick a material they exclude light: if the former be too thin they are useless. The yellowish colour which is reputed to wear best, is by no means a good one in respect of coolness; blue and green are much less favourable to the transmission of heat.

When hangings are used, they should be ample, and so fitted that no apertures may exist at the top or sides through which light (and heat) may pass into the rooms. This arrangement, if it entail a loss of light, secures an increase of coolness in the apartments.

Shutters, fitting well, and made of wood, or green stuff stretched over close-fitting wooden frames, or filled with blue glass, are much better non-conductors, and may be used in addition to the foregoing means. The old-fashioned white curtains are very good, especially when they hang in ample folds. Muslin and other perforated materials patronised by modern fashion are useless as a protection against heat.

On the subject of outside blinds he has nothing new to tell us. A suggestion to keep them wetted, after the fashion of Indian "tatties," by means of a garden syringe, fitted with a fine rose, might perhaps be useful in many cases, whatever its effects on the durability of the sun-shades.

After noticing the refrigerating effects of window-gardening, when foliacious in place of floral subjects are chosen, not alone by the shade thus produced, but by the caloric absorbed by the plants in growing, he continues his remarks as follows:—

Coolers.

"I have never been able to understand why the mechanical means which are resorted to for the alleviation of wintry cold should not be equally applicable to the reduction of the extreme heat of summer. It appears to me that this might easily be effected, even were it desired to produce a degree of temperature far below that which sanitary considerations render advisable."

He proposes that one or more chambers, having each a cubic content of 1 ft., should be formed ice the thickness of the outer wall. In each should be placed a case or chest containing pounded ice and sea-salt, or some other refrigerating compound, and having in the centre a close spiral coil of pewter or other metallic tubing, one extremity of which should be open to the external air, while the other enters the room at about the height of a man's head from the floor. The temperature would, of course, be dependent upon the length of the spiral coil, and the power of the refrigerating mixture. He believes that this arrangement which would not only introduce a supply of cooler air to the apartments, but as a necessary consequence would create a constant circulation of the air therein, might be applied, not only to dwelling-houses, but to carriages, palankeens, &c., at a cost little, if at all, exceeding that of the ordinary warming apparatus commonly used in winter. To obtain the full benefits of the refrigerating mixture, the case should be coated with some non-conducting material, as cork or straw. In a foot-note, he suggests that perhaps it would be better to divide it into three compartments by means of a couple of diaphragms. The upper and lower compartments should each contain a spiral coil of tubing, surrounded with refrigerating mixture. The coil in the upper one should have one extremity opening out to the air on the extreme surface of the wall, and the other leading into the middle compartment; in like manner, the lower coil should communicate between the middle compartment of the chest and the room. The passage of the air would thus be made as gradual as possible.

The admitted necessity of a continuous renewal of air in rooms leads to the subject of

Ventilators.

Even the simplest descriptions of ventilators have certain advantages, seeing that the disagreeable effects of extreme heat are in a great measure due to stagnation of the air. Air is a bad conductor of heat, and, in habited rooms becomes speedily saturated with moisture, to the impediment of respiration. When the air is set in motion, even though its temperature differ but little comparatively from that of our bodies, and though in all cases it is a bad conductor of caloric, the continued contact of fresh particles of a slightly lower temperature, and but lightly charged with humidity, relieves the skin of a large amount of caloric, and promotes the exhalation of moisture from it and from the respiratory organs, whereby the unpleasant sensations referred to are greatly alleviated.

For this reason, all ventilators have their uses, be they the old-fashioned notion of Hales; punkahs, or windsails; blowing-wheels, like those of Desaguiliers; the latifs of the Egyptians; or any other analogous invention designed to set the air in motion; for it must be remembered, adds the Professor, that few districts are blessed with natural ventilators such as are in use at Cesi, in Umbria, where the cool air from the numerous subterranean grottoes in the vicinity is conducted, by means of conduits made for the purpose, into the upper rooms of the houses of the inhabitants.

Colouring.

The colouring of rooms has a certain effect upon their temperature, as some hues are more favourable to the absorption and radiation of heat than others. In this respect we should follow the example of Nature, who is lavish in her blues and greens—the azure of the skies and the green of the fields,—and never employ white, which possesses the maximum of reflecting power, or black, which is the most perfect absorbent, except when combined as a neutral tint at once less offensive to the eye and less readily affected by the rays of heat.

Furniture

Should be light and not cumbersome, and constructed of good heat-conducting materials. At first sight it would appear that substances which absorb heat least readily would be preferable, but experiment shows that these in course of time become saturated with caloric, and retain it with intolerable pertinacity; on the other hand, materials which heat rapidly cool again with equal facility. Marble and scaglioli should, therefore, be preferred to wooden floors and draped walls, and metallic furniture to ordinary cabinet-work. Foliage plants have a good effect in a room so long as they are not of species requiring much moisture, which would be objectionable.

Amongst other artificial means of reducing the temperature of dwellings, Signor Orioli notes;—the practice of sprinkling the floors with water, which he holds should only be done during the hours the rooms are unoccupied; closing the windows and doors by day and opening them at night, which he observes is impracticable in many parts of Italy by reason of the malaria which rises after sunset; roof-gardens like those of Naples and Malta; trees planted in front of the houses so as to shade the walls, which he has heard is the custom in the streets of London (save the mark,) and he would like to see adopted in Italy.

Lastly, he suggests that the streets—at any rate, the most fashionable—might be shaded during the hottest periods of the day by means of ample awnings, similar to those sometimes used for horticultural purposes, which would secure a far cooler temperature, not alone in the thoroughfares themselves, but in the adjacent houses, whose walls would thus be perfectly shaded.

"Painter in Ordinary."—We mention with very great pleasure that Mr. James Sant, R.A., has been appointed to the office of Painter in Ordinary to Her Majesty. The fact that it came unsought and unexpectedly must have increased the gratification with which the intimation was received.

THE VENTILATION AND WARMING OF THE ROYAL ALBERT HALL.

THE subject of ventilation has within the last few years received much attention on the part of scientific men; and, from being a comparatively unconsidered detail in the arrangement and construction of our public buildings, has come to be regarded as a most important feature in the architect's labours. As might be expected in a matter so complicated and uncertain, much difference of opinion exists with reference to the most suitable means of attaining success; and there are probably few subjects with which the architect has to deal in which his judgment is more sorely tried than in forming a decision upon the respective merits of the many plans open to him for ventilating and warming the buildings under his care. It would be impossible, of course, to pick out any one system, and to affirm that that was the best and most applicable to every description of building; for various buildings differ so entirely in their requirements and internal arrangements that very important modifications, at any rate, would be needed in the plan we had decided to adopt, say in the case of a church, a hospital, and a theatre. But it is not only in this respect that difficulties arise; we are called upon to judge between hot air, hot water, and steam, between ascending and descending currents, between in-driving or exhaustion, and between the advantages or disadvantages of every conceivable position for the air inlets and exits. In the midst of all these conflicting theories it is satisfactory that all are agreed upon one thing, namely, the advantages of natural ventilation and plenty of it; and when we come to artificial ventilation we can refer in most cases to some building or buildings of a similar nature to the one upon which we are engaged in which this or that plan has proved a decided success. In the Royal Albert Hall, however, Colonel Scott was, in the matter of ventilation and warming, as in many other details of the work, almost entirely without precedents: the only buildings which we possess at all structurally similar—the old Roman amphitheatres—being uncovered, and therefore quite incapable of assisting him in some of the most difficult problems he had to solve. Regarding the question of ventilation from a common-sense point of view in connexion with the known laws of pneumatics and caloric, it is evident that in such a vast hall any attempt to subvert by artificial means the natural direction of the currents of heated air would be useless, and he was thus led to choose that system which appeared best to accord with and to supplement the ascertained direction and movements of heated gases.

Before further commenting upon the principles which have been adopted at the Albert Hall, it will perhaps be as well if I explain the apparatus and the contrivances which have been introduced into the building for the purpose of warming and ventilating it. To begin with the arrangements which have been made for the heating. In a boiler-house outside the hall are three powerful 30-horse tubular boilers, which supply the motive power to the various engines, and heat the water in nine condensers, which in turn feed 26,000 ft. of 4-in. cast-iron hot-water piping. The pipes are disposed in heating-chambers in the basement, and these chambers are so distributed as to facilitate the escape of the heated air into all parts of the building. The condensers are supplied with steam direct from the boilers, and each one heats the water for two distinct coils or systems of piping, arranged on the ordinary circulating principle of flow and return. The pipes, which run about 130 ft. to the ton, are made in 9-ft. lengths, with socket joints put together with yarn and iron cement. A provision in the contract is that the pipes should all be proved before they are used. They are arranged in tiers, and fitted into cast-iron coil-boxes, with the necessary expansion cisterns, air vents, ball-cocks for the supply of water, and shut-off valves from cisterns, &c.

In connexion with each coil of pipes is fixed a moistening tank to ensure the requisite hygrometrical degree of the air.

The condensers, I need scarcely say, consist of numerous metal tubes enclosed in a chest, in which the steam from the boilers is made to impart its heat to the water from the return pipes. By the plan of using condensing hot-water boilers, it becomes possible in a large building like the Albert Hall to work a part only of the coils at once without interrupting the series.

It will readily be seen that by checking the flow of air into and from these chambers containing the piping, a very high temperature may be attained; and that by regulating the current of air through and among the pipes, any desired degree of warmth in the chamber may be produced: I may therefore speak of them as hot-air chambers. The external air is supplied to these chambers by means of two down-cast shafts, each 6 ft. by 6 ft., and passes through a long underground passage, in which it will be strained through fine wire-gauze screens, and washed with water sprays, in the same way as is practised at the Houses of Parliament. It is then drawn into the fan chambers, from which it can be forced into the building at the rate of 3,600,000 cubic feet per hour. The fans are each 6 ft. in diameter, with four blades, and work on the principle of the screw. They are driven by two small five-horse power engines, of somewhat peculiar construction. To supplement the action of the fans, and, in cold weather, perhaps, to replace them, a powerful system of exhaustion has been introduced into the centre of the roof,—namely, an elliptical shaft, of nearly 700 square feet in sectional area, carried above the roof of the main building. The portion of this shaft above the roof-level is surrounded with movable louvres, which are arranged to open to any required extent. The suction-power of this shaft is capable of being increased by means of the heated air generated from three rings, containing 960 gas-burners, situated at its lower extremity. It is calculated that the vitiated air can thus be extracted, without the danger of the formation of descending currents of cooler air from the upper part of the building. The concave shape of the ceiling will, doubtless, favour the action of the extracting shaft by conducting the heated gases to its aperture in the centre. When speaking of the fans, I should have stated that the air from them is conducted in separate cold-air-channels, carried beneath the hot-air-chambers, but communicating with them through numerous orifices; and that the amount of air entering these chambers can be adjusted to a nicety, by means of iron valves, of simple construction. A further control over the amount of air entering the building is provided for by the introduction of a patent self-acting valve, with proper counterpoise into the main air-channel supplying the fans. To this valve is attached an indicating dial which registers the quantity of air passing through the fans, and enables the engineer to work them according to the requirements. Before explaining the mode in which the air is distributed, I must briefly describe the form and arrangement of the building. The hall proper, which is nearly a true ellipse, is 220 ft. by 186 ft., and 135 ft. high; it is surrounded externally by a zone of staircases, crush-rooms, and waiting-rooms, 20 ft. in width, which, at a height of about 60 ft. above the floor-level, is thrown into connexion with the main hall by an arcade of thirty arches. The picture-gallery thus formed, which is top-lighted and may, if required, be separated from the hall by means of curtains, entirely encircles the building, and measures on the outer wall 800 ft. in length. The floor of the hall, called the arena, is 102 ft. by 70 ft., and occupies the centre of the room. Round the arena, and raised 6 ft. above it at its lower extremity, is an amphitheatre composed of thirteen rows of seats rising one above the other, beginning with a rise of 7 in. and ending with one of 18 in. Surrounding the amphitheatre are two tiers of boxes, above which again is a balcony projecting 21 ft. from the main wall, and seated with eight rows of seats, the upper one of which is only a few feet below the arches of the picture gallery. Behind the boxes, and round the amphitheatre and arena, are corridors, 9 ft. wide at each level; which corridors are in communication with the boxes on the one side, and with the staircases, exits, and waiting-rooms on the other.

From this brief explanation it will be easy to see that we have here several distinct parts to deal with, and in arranging the heating chambers special provision has been made to meet each case. Beneath the floor of the arena a vast heating-chamber has been constructed, from which the heated air is emitted over its entire area through numerous small apertures in the boarded floor. A second heating-chamber is allotted to the amphitheatre, the air from which issues through a succession of small opening in the risers. The third and principal chamber is beneath the zone of corridors, and just against the main wall of the Hall on the one side, and the wall carrying the boxes and balcony on the other. From this chamber flues situated in either wall convey the air to every level, and issue finally in the floors of the picture-gallery and balcony. Numerous distinct openings in these flues distribute the fresh air into every enclosed room, and these openings are in all cases where practicable placed at points distant from the inmates. By these various arrangements the entire power of the apparatus may be concentrated on the Hall at the same time, affording the opportunity of heating the enclosed rooms independently when needed. As will be, I think, understood from my description, the air-chambers can be used for the admission of either warm or cold air to the Hall, and by certain special valves, connecting flues, and distributing channels, it becomes possible when the Hall is full to continue to introduce heated air over the whole floor area of the building, and to force in cold air at every level by means of the main chamber, and the flues in connexion with it, or *vice versâ*.

I now come to the temperature stipulated for in the contract—this is for the main hall and the enclosed rooms, during the winter months, a mean of 58° Fahrenheit, and not lower than 55°. For the corridors, stairs, &c., the temperature to be a mean of 55°, and not lower than 52°, Mason's hygrometer to register not more than 10°. During the summer months the mean temperature is to be below the external temperature of the air.

In a lofty room containing close upon 5,000,000 cubic feet, and destined to accommodate, at times, 12,000 individuals, placed at different levels, the supply of fresh air is a matter of vital importance; and whatever be the plan of ventilation adopted, the vitiated air can only be properly carried off by means of powerful ascending currents. The danger of powerful currents is the numerous draughts they occasion; and, as in the hall the foul air from 5,000 persons at or about the floor-level must pass, on its way out, certainly an equal number of persons on the upper floors of the building, the problem was so to contrive the inlets and exits as to avoid, as far as possible, the discomfort of draughts, which cannot be quite obviated in such a large room, and to drive the vitiated air from below, away from the people at the higher levels. The methods employed for attaining these results, which I may briefly describe as the forcible introduction of pure air (heated in the winter-time) over the whole of the lower portion of the building, and the forcible extraction of the vitiated air at one large orifice in the centre of the ceiling, seems to point to the successful solution of the problem; for it gives a cone-shaped collection of currents or draughts, the apex of which cone is in the centre of the roof, while its base is extended, extinguisher-fashion, over every inmate of the building. Having thus endeavoured to point out, both practically and theoretically, the systems of warming the Hall, I have only to add, in conclusion, that this plan has, together with the various contrivances and appliances which I have described, been designed under Colonel Scott's direction, by Mr. Wilson W. Phipson, C.E., who has also taken the contract for the work. GILBERT R. REDGRAVE.

SIGN-WRITING AND GLASS-EMBOSSING.*

A CLEVER little book has just appeared upon sign-writing and glass-embossing, which will, we think, interest many persons besides sign-writers and glass-embossers. The author has ingeniously tacked on to his subject several others, which, without being identical are sufficiently kindred to deserve to be associated with it, and which give it an antiquarian and historical lineage. Long before we are introduced to sign-writing proper, in its every-day modern aspect, he tells us of the *signes* of old that pilgrims purchased; and straightway we have Chaucer and his Canterbury pilgrims before us; then he steps up to the texts and writings formerly fixed about churches; and thence to the scrolls artists in stained glass, as well as painters, placed in the hands of the figures they delineated, either to identify them or to furnish speech to them. Wall-paintings, both "texte and glose," thus come in; illuminated missals are touched upon and quoted for the forms of their letters; Mr. Hotten's capital book upon house and shop signs, noticed a short time ago in these columns, is dipped into; inscriptions upon tombs and monumental brasses are brought to bear; and, in fine, before we have got through the first chapter, the reader begins to look upon sign-writing with a different degree of respect to that he would have been apt to accord it, but for Mr. Callingham's mode of introducing the art. He tells us that it is on the eve of a great access of consideration; for the revived custom of adorning churches with passages from Scripture, requiring at the hands of the sign-writer a knowledge of the grammar of ornament, as well as taste and neatness of execution, will call for more gifts than mere facility of lettering. Hitherto, in modern times, the sign-writer has been grouped with the sign-painter, ticket-writer, and grainer; and sign-writing has been without its literature; but Mr. Callingham has brought the sign-writer to the front, and headed the possible literature of the art with the agreeable little book we now recommend. There is a technical chapter, devoted to a description of the proper modes of drawing essential lines; and there is another to the setting out of writing so that the letters may appear at even distances from each other, which they would not do if placed at exactly regular intervals; and then we come to two of more general interest, though equally useful for trade purposes, on alphabets and numerals. The first of these relates to modern alphabets, and in the second we have some Mediæval specimens. The mysteries of thicknesses and shadows, of perspective, of colour, and of methods of gilding, fill five full, explicit chapters; and then we are formally introduced to glass-embossing.

There is no antiquity claimed for this art. It is absolutely our own, and this is the first work, the author thinks, that has appeared upon the subject. Perhaps it is, we admit; if, with more rigour than Mr. Callingham has used with respect to sign-writing, we exclude treatises upon subjects that are so nearly akin to it as to be scarcely distinguished from it. But our writer argues that it is an art that is the result of the great improvements in the manufacture of plate glass. Etching on glass was discovered, he owns, by Schwanhardt in 1670; but then, etching is not embossing. It takes a metropolitan writer to become a good embosser; when a provincial undertakes the work it is generally unsatisfactorily executed, probably from want of practice. Hence all provincial orders, by common consent, appear, he says, to be forwarded to London houses. What do Messrs. Chance and some other country houses say to that? The great gin-palaces are the principal buildings decorated in this manner, and, let us add, mostly badly.

Besides exact details for mastering this art and that of burnishing, to which we refer all who are thinking of practising as embossers and burnishers, there is a concluding chapter calling attention to the frequency of error in sign-writing owing to an ignorance of orthography by the writers or their employers; and further to obscurity in written announcements from want of giving proper prominence to the words expressing their leading meaning. "Dying done here," "chops and stakes," "mangleing," are instances of the first kind; and we will quote an instance of the second:—

> "At the Vauxhall Railway Station there is a good example of this. The following words are painted on a board:—'Passengers are requested not to pass beyond this point.' There are four large lines, which are,—'PASSENGERS,' 'REQUESTED,' 'PASS BEYOND,' and 'POINT,' the last being the largest of all. The other words are painted very small. At a short distance, the request reads just the opposite of what is intended, the 'NOT' being almost imperceptible; whereas the words, "NOT TO PASS,' should form the principal line on the board, as they really contain the gist of the announcement."

Taking it from first to last, indeed, Mr. Callingham's little book is smart and clear, and will give a new dignity to the somewhat humble art of the sign-writer. He is ready with his joke, too, to lighten his student's labours, and little flashes of criticism and observation to make them wary. The extraordinary manner in which the late Mr. Charles Dickens was encountered in the most unexpected places, has been the matter of comment. And now, again, we are startled in this unobtrusive book on sign-writing by a page upon his eccentricities of orthography:—

> "We remember an instance in which a sign-writer had to paint on the door-post of a doctor's residence the words 'visitor's bell;' and the workman, having been reading some of the late Mr. Charles Dickens's works, rendered the first word as the great novelist himself was in the habit of spelling it, substituting 'e' for 'o' in visitors. . . . Speaking of Mr. Dickens recalls another speciality of his, which it is as well to caution the sign-writer against. It

* "Sign-Writing and Glass-Embossing: a complete practical illustrated Manual of the Art." By James Callingham. London: Simpkin, Marshall, & Co.; Brodie & Middleton, Long Acre. 1871.

is that of rendering the plural of Miss by adding 's' to the end of the surname. Thus, in the case of two young ladies of the name of Brown, he would write, 'The Miss Browns,' instead of 'The Misses Brown.'"

As to visitor, by the way, "er" is just as right as "or."

To go back, the greater part of the writing we see in our streets is vulgar and bad. The little book before us should do something to improve it, but the lesson needs carrying on further with the aid of a cheap set of beautiful examples in colour, for the proper production of which an artist is needed.

REVELATIONS OF THE TRUCK SYSTEM.

We may expect shortly some more disclosures concerning the working of this system in the centres and outposts of our several industries; but before we are favoured with a report by the Commission now engaged upon the subject, we will briefly touch upon the evil as we have come in contact with it in many parts of the empire. We have witnessed the serious consequences resulting from its working, and we can, in anticipation of other evidence, join in its condemnation, while we can admit that it is possible to work the truck system in a modified form, in a humane and philanthropic way, and make it confer advantages upon working men and women, particularly in localities distant from towns. We must assert this has not been done. The men and families who were perforce compelled to deal at these "tommy-shops" were obliged to pay often, in fact always, a higher price for the necessaries they wanted than these could be procured at in free shops; and generally the tommy-shop and the truck store vended the worst description of goods. We have known instances, in our experience, where no money at all was paid for labour, but provisions, groceries, and articles of clothing had to be taken in lieu. The workman, of course, in this case, was often obliged to take more things than he actually wanted. To get rid of his surplus articles he was obliged to hawk them about, and resell them at a loss, or make an exchange in the primitive fashion,—barter one article for another; the consequence was, that the workers under the truck system were always in a miserable condition. They never could procure what they required, the food was bad, and the articles of wear were often worthless. Looking back a quarter of a century, we can see the truck system at full work in various ways and in various places. The contractors or sub-contractors of many of our early lines of railway in the three kingdoms, contrived to add to their gains by establishing "tommy-shops" in different towns on the lines of their contract. We have visited many of these extemporised stores, which, although they were not licensed to sell malt liquors, yet contrived to have it for those who could hold their tongue. Tobacco, the other great necessity, could be had in abundance, and even other contraband things. The navvy being a bird of passage, with no settled home, cared little so long as he had constant work and a little surplus in cash for a drinking bout on Saturday night and Sunday.

The "tommy-shop" supplied him with tea and sugar, tobacco and bacon, on "tick," and he was certain that his job would last until the works were finished, without a discharge. Independent of the railways, the "tommy-shop" and the truck system flourished in connexion with the iron-mines, collieries, weavers, glove-makers, lace-makers, cloth-makers, mill-owners of different descriptions, and even among the agricultural labourers in the south and south-west of England. The same principle that induced large contractors or their agents, or large manufacturers and their overseers, to establish a truck system in eatables and drinkables, also actuated them to build dwellings for their workpeople, and compel them to live in them. In the great majority of the mining districts of England and Scotland there are villages almost exclusively inhabited by miners and colliers. If there be an empty house, the fresh hands that may be taken on are expected to remove at once to it. In some instances we must admit that the houses built by the mining proprietors are more fit for habitation than many which are to be found elsewhere, but the evil of compulsion is not the less to be condemned. Any large employer, or firm of employers, who like, are at perfect liberty to speculate upon the wants of their workmen, and in a legitimate manner to build homes for their well-being, or supply food for their convenience,—provided that it is optional with the workmen to do as they please in respect to their patronage. We have, however, in our experience, been a witness to acts not only of coercion but of tyranny in this matter. The system of paying tradesmen and mechanics by monthly and fortnightly settlements is fraught with serious evil, and it is a cruel hardship when this system is enforced with agricultural labourers. Fortnightly payments are quite common; and even where there is no truck system in connexion, a fortnightly payment to workmen is productive in most cases of bad results. When the money reaches the wife for housekeeping duties, it will be found that the half of it is already owing, and that the pawn-shop will have to be more than once visited to square matters before the next pay-day.

There are many large manufacturers and mining firms who will no doubt aver that the truck system is no advantage to them. If it be of no advantage, in either saving the workman's time or making double profit out of his labour, why has it been so generally adopted over the country? It is not the manufacturer or proprietor in chief in some instances who benefits exclusively by the truck system, but his agents, overseers, and underlings, who are supposed to manage the business for him, but who very cunningly contrive to work the profit and per-centages for themselves.

Where workmen are single men the evil of the truck system is not so widespread in its effects as in the case of workmen with families, but it is all the same to the managers and overseers, who have the power of employing or discharging.

While upon the subject, we will just remind our readers and the public that there are many kinds of the "truck system" rife amongst us, and the offshoots of the parent tree are widely ramified through society. The present Commission sitting upon the matter might with advantage widen their labours, and when ready give the public what they expect,—an exhaustive report upon the whole subject and its surroundings.

It will no doubt surprise many people to be informed that a species of truck system exists in many of our City workshops in the building and other trades; but the system is not confined to London alone: it exists in a similar way in Glasgow, Edinburgh, and Dublin,—indeed, it is general over the kingdom. We will just show how the little dishonest scheme works, and how the thin end of the wedge is driven in. Many of the overseers, managers, and foremen of various firms have public houses, groceries, and provision stores. Where they have not the ownership, their relations have; so to the new hands who may be taken on it is softly insinuated by a friend that he is expected to patronise Mr. So-and-So. We have known this *sub rosâ* species of truck system to be extensively worked in many parts of the country, and in the City too. We have known instances of workmen drinking half of their hard earnings in beer-shops and public-houses kept by foremen and overseers, and this practice many of them had to continue for the purpose of keeping themselves in employment. All men of course would not stoop to this debasing practice. The inferior workman will be found to do it, and, in some instances, the good workman who is unfortunately addicted to drink. Thus we have bad workmanship because we have debased foremen and overseers. And this is the truck system, under a modification, profited in by the employer's agents instead of the employer himself.

Reverting to the original truck or "tommy-shop" system, we will add that we have known food unfit for use to be often sold in these places, and always a higher price charged than it could be had for elsewhere. The wife and children of the workmen were, however, obliged to take what was in the store, for there was no choice left to them.

The canteen system in all our military barracks and regimental depôts in different towns and cities is little better than the truck system. These soldiers' "canteens" are rented or leased by the barrack-master to the highest bidder, and every article that may be had in an ordinary public-house, grocer's and provision shops combined, may be purchased here. It is intended for the use of the soldiers, but civilians and outsiders, who, as workmen, assistants, &c., have business in connexion can avail themselves of the privileges. The articles here are supposed to be sold on a cheaper scale to the soldiers than outside, but what they save in pence they generally gain in poison. The drinks are bad, and the food is inferior. There is a distinction made, however, by the canteen landlord; he will not sell a bad article if he can to an officer's servant. The wall is for the weaker still, as the old proverb has it, and it is the privates who have to suffer.

Soldiers' canteens should get an overhauling, and where the old system on which they were carried is still in vogue it should be exposed. It is a matter that calls for inquiry. It embraces a species of both truck and traffic in its management not very creditable.

The rise and growth of the co-operative store system in the north of England has nearly annihilated the old tommy-shop. The Rochdale experiment being a success, other ventures and successes follow. Here in London we have the Civil Service co-operative store, and a seemingly well and thriving concern it looks. There is no end to the working of the system, but, like every other great change, there are dire evils in the state of transition. The retail trader, if the co-operative system spreads much more, will certainly feel a severe pinch. Tyranny, coercion, and injustice belong to the truck system in less or greater degrees, and as hardships belonging to the tommy-shop produced the co-operative store, and gave the workman purchaser a share in the profits resulting from his outlay, so the overcharge made by the retail dealers for articles which are undoubtedly adulterated will gradually drive other classes in London besides the Civil Service into co-operation for mutual protection and advantage.

Workmen should be paid weekly, and not in public-houses; and all their payments should be the same as with the classes above them,—in money. If they make bad use of it, they are themselves to blame. They should be at liberty to choose their own residences, and purchase their daily or weekly necessaries where they think fit. It is true philanthropy to give them better homes, and to give them facilities for obtaining better goods, and at a cheaper rate, than their own individual exertions can procure; but it is neither philanthropy nor justice, but the very reverse, to make it obligatory upon them to live wherever a bad landlord may desire, and to make them purchase where and what his agent, acting under him, wills.

We anticipate that the Truck Commissioners will supply the public with statistics, gathered in the north, south, east, and west of the country, Wales included. The figures ought to show the immense sums that are paid, or should be paid, in earnings; the amount of capital represented by "certificates," which pass current as legal tenders in some places; and the amount of probable double profits that find their way back again into the employer's business. In a word, the Commissioners' Report should show us the truck system as it exists, with its advantages, if it possess any, and with all its acknowledged and obvious defects.

LAND PURCHASES OF THE TUNBRIDGE AND DARTFORD RAILWAYS.

A paper on this subject, by Mr. Edward Ryde, was read at the ordinary general meeting of the Institution of Surveyors, January 30th,—Mr. E. J. Smith in the chair.

The property actually purchased, including houses and land for stations, not provided for in the Parliamentary estimate, extended to an area of 513a. 2r. 31p., and cost 230,156*l.*, an average of 448*l.* per acre, or 6,800*l.* per mile. Of this quantity, the land taken for stations amounted to 32a. 1r. 2p., and cost 11,069*l.*

A little line, called the Mid-Kent Loop, not contemplated in the original works, consumed an area of 1a. 1r. 21p., and cost 500*l.*

An area of 4a. 3r. 10p. was taken, at a cost of 1,700*l.*, for temporary and special purposes.

Surplus lands, to the extent of 30a. 0r. 16p., have already been sold for 15,610*l.*, and surplus lands and houses remaining, to the extent of 23a. 3r. 35p., are at least of the value of 14,911*l.*

All these extra items, together amounting to an area of 92a. 2r. 4p., and to a cost of 43,790*l.* reduce the land purchased for the railway proper to 421a. 0r. 27p., or an average of 12·44 acres to the mile, acquired at a cost of 186,366*l.*, an average price per acre of 442*l.* 10*s.*, and per mile of 5,506*l.*, as compared with an estimated quantity of 409a. 2r. 33p., a cost of 192,000*l.*, an average per acre of 468*l.* 12*s.*, or per mile of 5,673*l.*

The claims sent in numbered 431, of which (regardless probably of the vested interest of surveyors) 397 were settled by agreement without the intervention of juries, arbitrators, or professional witnesses. Of the remaining 34, 26 were referred to arbitration, and 8 were settled by the verdicts of juries.

The arbitrators were Mr. John Clutton, Mr. Henry Arthur Hunt, Mr. Daniel Norton, Mr. George Pownall, Mr. John Shaw, Mr. John Oakley, Mr. Frederick James Clark, Mr. Robert Collier Driver, Mr. Francis Vigers, and Mr. George Barnes Williams.

To go into further details. In Lewisham parish 31 houses and 4a. 3r. 3p. of land cost 27,218*l.* Market-garden ground to the extent of 4a. 1r. 13p. cost 3,945*l.*, or an average of 911*l.* per acre. The brickfield land, measuring 2a. 1r. 11p., cost 4,114*l.*, or 1,774*l.* per acre. And 33a. 1r. 17p. of building land cost 17,766*l.* or an average of 533*l.* an acre.

In Lee parish, 27a. 2r. 32p. cost 8,161*l.*, or 295*l.* per acre.

In Bromley, 26a. 1r. 36p. cost 20,197*l.*, or 763*l.* an acre.

In Chislehurst, 16a. 1r. 29p. cost 8,692*l.*, or 529*l.* an acre.

In Orpington, 29a. 2r. 8p. cost 4,701*l.*, or 159*l.* an acre.

In Farnborough, 10a. 1r. 12p. cost 1,920*l.*, or 186*l.* an acre.

In Chelsfield, 21a. 1r. 1p. cost 4,479*l.*, or 210*l.* an acre.

In Halstead, a farm homestead and 1a. 2r. 38p. cost 1,861*l.*

In Shoreham, 15a. 2r. 9p. cost 3,249*l.*, or 209*l.* an acre.

In Otford, 31a. 0r. 37p. cost 8,789*l.*, or 281*l.* an acre.

In Sevenoaks, 72a. 2r. 24p. and four cottages cost 22,952*l.*, or 316*l.* an acre.

In Leigh, 3a. 2r. 10p. cost 746*l.*, or 209*l.* an acre.

And in Tunbridge, 56a. 3r. 23p. cost 13,172*l.*, or an average of 231*l.* an acre.

On the Dartford line, 20a. 2r. 35p., in Lewisham, cost 6,200*l.*, or 299*l.* an acre.

In Lee, 13a. 1r. 12p. cost 5,423*l.*, or 407*l.* an acre.

In Eltham, 43a. 1r. 4p. cost 14,332*l.*, or 331*l.* an acre.

In Bexley, 64a. 0r. 13p. of land and some houses, a tanyard, and a brewery, cost 31,407*l.*, or an average of 490*l.* an acre.

In Crayford, 6a. 1r. 22p. cost 3,281*l.*, or an average of 513*l.* an acre.

And in Dartford, 6a. 1r. 38p. cost 1,400*l.*, or an average price per acre of 216*l.*

BUILDERS IN ACTON.

IN connexion with occurrences in Acton to which we referred recently, a meeting of builders was held there last week, to take into consideration the actions of the local board, and to form a builders' association. Mr. Parsons was called upon to preside.

The Chairman, in opening the proceedings, said it was evident from the gathering of builders present that they felt there was a grievance under which they suffered, and this meeting had been called by them to form an association to protect their interests, that all might combine to help a fellow builder when it was thought that arbitrary measures were being used against him. If that was to be the object of the association, he for one would do all in his power to assist the association. He was sure that the association was not in any way intended to act in antagonism to the local board, but simply as a protection. He believed that the board had not yet contradicted the statement of Mr. Robertson, and he was not sure that they could do so. They might be sure that when such a paper as the *Builder* took the question in hand, there was something at the bottom of the affair. If it was shown that the statements were not true, then he had no doubt the local board would seek a proper remedy. But what was wanted was the adoption of the Metropolitan Building Act. If that Act was adopted in its entirety, the builders would then know what to do, and not be in the doubt they now were with the bye-laws of the local board.

After some discussion, the "Acton Builders' Association" was constituted, its first purpose being to obtain the adoption of the Metropolitan Building Act. It was afterwards resolved "to support Mr. Robertson in the event of proceedings being taken by the local board against him."

The Acton local board have since published a denial *seriatim* of the charges made against them.

A FRENCH ARCHITECT AND THE WAR.

THE *Daily News* prints a letter received by one of its correspondents from M. Cæsar Daly, of the *Revue Générale de l'Architecture*, giving a sad picture of the loss the war has brought upon him:—

"The Prussians have occupied our country-house, near Paris, since the third week of September. A battle took place in our grounds, and the whole commune is devastated. The park and gardens, which, you remember, were improved at such great expense, and on which such an endless amount of care was bestowed, are now a miry waste. All the shrubs, I am informed, were torn up for firewood by our amiable German visitors. My pictures were wantonly destroyed,—that is to say, all that I left behind. The looking-glasses were looted, as well as the library, which I used to flatter myself attracted you to ——. My wife had the precaution, when she knew Paris was going to be invested, to take up the carpets and send them with the beds within the fortifications. To avenge the want of sleeping accommodation, the Bavarians ruthlessly cut down the fruit-trees, which we were at such pains in collecting and planting, and smashed the melon and cucumber frames. The green-houses are entirely things of the past, and there is not a floor nor window-frame in the house. Whenever we get back, what shall we find of our house and grounds? A field, and little more. Our villas at Neuilly were razed by the Defence Committee. God knows that I do not repine at this loss, and shall rejoice in it if I learn that Paris has been the gainer by it. Bombs are falling around our town residence. A chimney and a part of the roof next door to our house have been broken down. Had the projectiles gone another yard farther, those ceilings which you so much admired would have been destroyed."

M. Daly thinks that England has lost all weight in the councils of Europe, because she has not interfered to stop the war. It is distressing and vexatious to find that a man of the capacity and enlightenment of M. Daly,—loving England, too, as we know he does,—should be able to hold such an opinion. Supposing that the French had succeeded in the objects with which they rushed into war, had invaded and held the Rhine provinces, and had marched a victorious army into Berlin, what would they have said if England had sought to induce them to resign the spoil? All England has grieved bitterly and sincerely at witnessing the frightful disasters that have overtaken France; but to go to war with Germany because France had not succeeded in her evil designs, and had brought upon herself retribution, over-bitter as it has been, could never have been thought of by a sane community. Our esteemed friend, M. Cæsar Daly, with whom many of our readers will warmly sympathise, will hereafter, we are persuaded, view very differently the position and doings of England.

GRAY'S ELEMENTARY SCHOOL COMPETITION.

THE promoters of Gray's Elementary Schools, Essex, recently advertised for designs in competition. Twenty-eight sets were sent in, and a design by Mr. Thos. Rook Maples was selected.

AN ACCOUNT OF ST. THOMAS'S HOSPITAL.*

THE designs were completed in June, 1865, and were exhibited to the governors and others interested in the subject at the London Bridge Hotel for some weeks, and were ultimately approved by the General Court of Governors and by the Court of Chancery, whose sanction, under a special Act of Parliament, it was necessary to obtain. In April, 1866, the contractor for the Embankment having made considerable progress with the river wall, and being about to commence filling in and levelling the site, I reported to the governors that it would appear most desirable that the foundation of the hospital and the Embankment works should proceed simultaneously, and thus avoid the great expense of excavating and removing the material which was about to be filled in, and save a considerable amount of time in preparing the foundations, while the necessary details and contract for the superstructure were being prepared. A contract was made with Mr. Webster for the foundation works, and he at once proceeded vigorously with the same on the foreshore; but great difficulty was experienced in obtaining possession of the several properties which fringed the bank. The building stands partly on land reclaimed from the river, and partly on the shore. The foundations on the river portion are carried down to the London clay. Those on the shore stand on a sound bed of gravel, which overlays the London clay, the difference in level being obtained by wide steppings, as shown on the sections. The ends of the blocks next the river have a solid foundation of about 22 ft. deep over the entire surface, forming a toe to the whole. The long flank walls of the pavilions have a foundation of 10 ft. in width, and the same depth, 22 ft., up to the old river wall. The concrete is then stepped up, and a platform of concrete, about 5 ft. deep, is laid over the whole surface of the remaining portion of the building. The land or spring water stands at a level of about 4 ft. above the clay. A drain was laid along the whole length of the hospital, at the back of the river wall, to a sump, and the excavations were all pumped dry before the concrete was put in. The whole of the concrete is composed of blue lias lime and clean Thames ballast up to a little above the land water-line, in proportion of six to one; all above that in the proportion of eight to one. The strata on the shore consisted of made ground; then gravel, varying in compactness, resting on the London clay, which rises gradually up from the river. The strata on the river portion consisted of loose and sandy gravel down to the clay. The Embankment wall is also carried well down into the clay. As regards the terrace wall, which intervenes between the end of the hospital blocks and the Embankment wall, there was no weight of superstructure to carry, but it was necessary to go down to the clay to get anything like a bottom. To have carried the whole down would have been very costly. It was therefore determined to build it on piers and arches. These piers were carried down 5 ft. square in concrete, six to one, as before, and arches turned from pier to pier in Portland cement concrete, in the proportion of five to one, the ballast being fine and small. The arches were turned on boxed centres, which were shifted from time to time, as the concrete hardened, and the ground filled in all round. Two or three of these arches were turned in Coignet's *béton*, as an experiment; but the Portland cement concrete was found equally strong and cheaper. The foundations of certain portions of the low outbuildings at the extreme end of the ground are executed on the same principle, on piers and concrete arches. I am glad to state that, owing to the care with which the foundations generally were put in and the superstructure raised, I am unable to discover the slightest settlement over the whole area of the extensive building. Scarcely any relics of antiquity were found in the excavations.

During the execution of the foundations the working drawings and specification for the superstructure were completed, and the bills of quantities were prepared by Messrs. Strudwick & Co., and Mr. Richard Roberts, and tenders were received on July 18th, 1867, from fourteen of the most eminent builders, the amounts ranging from 382,000*l.* to 332,748*l.*, which latter was submitted by Messrs. John Perry & Co., of Stratford, and which after full consideration was accepted. Had stone ashlaring been used instead of red bricks, the additional cost would have been about 25,000*l.*, which the governors did not feel justified in incurring, and which, personally, I see no reason to regret. The contract was settled in October, 1867, and the contractors commenced erecting stone-sawing machinery, laying down tramways, and making other preliminary arrangements, and on the 13th of May, 1868, her Most Gracious Majesty laid the first stone. The ceremony was conducted with much state, in the presence of 3,000 spectators, in a pavilion erected specially for the occasion, and the arrangements appeared to give general satisfaction. The stone laid by the Queen forms the north-east angle of the substructure of the chapel, and stands above the ground-floor line at the foot of the public staircase.

I will now proceed to state a few details of the construction the warming and ventilating arrangements, and the cost. The footings were built with what is technically known as No. 2 wire-cut Gault bricks, and the specification provided that the walls generally were to be built with the very best stocks, but that the piers in the flank walls of wards were to be built with Gault bricks, for reasons which I will presently

* By Mr. Henry Currey. See p. 59, *ante*.

describe, but owing to the great difficulty in obtaining a satisfactory stock brick in such quantities as we required the contractor found it to his advantage, considering the small amount of fracture and waste, to use Gault bricks, and the whole of the work is executed in that material. They make excellent, good, sound work, but unless the joints are left very rough on the edge they do not afford so good a key for plastering as ordinary stocks. The greater portion were supplied by the Burham Brick Company. Inverted arches are turned under all window openings above the footings, and the piers in flank walls of wards being reduced to a small area by the large window space desired, and having to bear on the ground story an accumulated weight of 110 tons, were carried up with the very best Gault bricks in Portland cement, with Portland stone bonders the whole size of piers, introduced at every 4 ft. in height. Every alternate window in the basement was omitted with a view to obtain a larger area of piers on that story. Hoop iron bond is introduced at the level of each floor where it runs continuously round the building without any necessity of severance. The area walls, 14 ft. in height, were built, as shown on plans and sections, with a view to resisting the great pressure of earth filled in at back, and to preserve the facing from being disfigured by percolation, the base of the pockets being filled in with concrete. The building is faced with red bricks, and great pains were taken in ascertaining the best quality for the purpose, and none appeared equal in quality and colour to the Fareham brick. Negotiations were therefore entered into with Mr. Cawte, of Fareham, in Hampshire, who opened a new field adjoining his old works, and made special arrangements for supplying the quantity required, which were put into vessels at his yard, and brought alongside at Westminster, thus avoiding the damage and breakage of railway transit and carting from station. The bricks were made specially, and the size so arranged as to bond accurately with the Gault backing. The bricks are excellent both in colour and quality, and Mr. Cawte used every exertion to keep us supplied with material as the work progressed. The number of bricks consumed, exclusive of the facing bricks, has been about twenty-five millions. The stone used is for the most part brown Portland, from Messrs. Hollands, Waycroft, & Maggott's quarries. No. 17 saw-frames, besides hand-saws, have been constantly at work sawing the material, and the capacity of these saws appears to have been the gauge of the progress of the structure. Steam moulding machinery and large rubbing beds have also been used to a considerable extent. The quantity of stone used has been about 370,000 cubic feet. The consoles under the main cornice, the caps of columns and pilasters, the balusters, and the vases and terminals on the balustrading were executed in Ransome's concrete stone. The material appeared peculiarly fitted in the present case where there was necessarily a great repetition of the same model, and consequently a considerable economy. Had it not been for this useful material I should probably have had to be content with the long line of balustrading unbroken by any vase or terminal. The pedestals would have remained vacant as they do in many instances where designed for sculpture, but the sculpture never arrives. It harmonises well with the Portland stone, and although many of my professional brethren would hesitate to use any artificial material, I venture to think that such hesitation may be carried a little to excess. The floors and flat roofs are constructed with wrought iron girders and "Dennett" arching. The latter material, as you are well aware, is composed of broken bricks or stone and sulphate of lime, in the proportion of three of brick to one of sulphate of lime, spread as concrete on a centre; a large quantity of the slag from the potteries at Lambeth has been used, and forms an excellent material for the purpose. The spans are for the most part 8 ft. or 9 ft., the thickness at the crown being 4 in., increased to about 9 in. at the haunches.

It was thought desirable throughout the wards to have flat ceilings, but throughout the corridors and a great portion of the hospital the arches and girders are left to show the construction, the soffits of the arches being finished with a setting coat of plastering. The joists and sleepers, or concrete and paving, are laid on the top of the Dennett arching in the ordinary way. The wagon-headed ceiling of the chapel and the groining of the aisles are also executed in the same material, the aisles having stone ribs. The thickness in the panels is 5 in., and in the stiles 10 in. The reason which induced me to adopt this mode of construction for the chapel roof was not only the satisfaction of having a real sound solid construction, but it afforded an opportunity of carrying up several flues to the apex of the roof, which must otherwise have cropped up in an objectionable mode on the balustrading. The flues are carried across the groining of aisles on the back of the main ribs, then up the piers of the clearstory walls, and again on the back of the main roof, provision being made for sweeping at certain points easy of access. I may here mention that the flues from all the low buildings are taken across the corridor ceilings, and carried up with the main building, thus avoiding all risk of smoke and disfigurement. The ceiling of the governor's hall is constructed with iron girders and "Dennett" arching for the same reasons. The flues for the rooms on the lower floors had to be disposed of, and instead of interfering with the parapet and balustrading, were carried over the back of the cove, and taken out of the roof in the ordinary way. The "Dennett" material is certainly very handy in execution; it accommodates itself to any form of arch or groin; it is strong, has great resistance against fire, and, when set, does not exert any lateral pressure; but care must be taken, and a liberal allowance made for expansion during the process of setting; and, finally, I believe it is as cheap, if not cheaper, than any other fireproof construction. The superficial area of arching used at the hospital in floors and flats is about 337,000 ft.

The riveted iron girders, of which there are about, 1,250 tons, were made in Belgium, at the Sclessin Works; and although not quite so neat in finish as one would wish (many being exposed to view), yet, at the same time, they are composed of excellent material, and stood the proof tests well. They were delivered very regularly, and the delay which so often occurs from the non-delivery of ironwork was avoided. The flat roofs over low buildings and corridors, which in many parts form terraces of communication, are constructed in a similar way. The surface of the arching is covered with concrete, laid to the required fall, and then covered with asphalte,—"Pilkington's Patent," which consists of the introduction of a layer of felt between two coats of asphalte. The lower coat is laid in Polonceau, about ½ in. thick, and the upper coat in Seysell, ½ in. thick, with flushing of the same material. The whole, as well as the paving in the basement, has been executed by Mr. Pilkington, in an excellent manner. The paving and channel stones used in the areas are the patent Victoria stone, composed of granite chippings and Portland cement, cast in moulds, and indurated by a process somewhat similar to Mr. Ransome's. It forms a capital paving, and a considerable saving has been effected by using it in lieu of rubbed York. The traffic in the areas is, of course, unimportant, but the paving in question has been severely tested in the Poultry and on Blackfriars Bridge, and is standing the test well. The corridors are paved with tiles 1 ft. square and 1 in. thick, in alternate squares of red and buff, with black borders. They are executed in Ransome's material, specially indurated; and when one considers that this material is found most effectual as a grindstone, I am induced to expect that it will stand the effect of friction as well, if not better, than any natural stone. The cost of such paving, bedded and jointed in Portland cement, is very moderate. The quantity required will be about 30,000 ft., and I do not think so good an effect could be produced in any other material with equal durability at so small a cost. The floors of wards are laid with wainscot, as being non-absorbent, and the walls are plastered with Parian cement, with the same object. It has been endeavoured to incorporate a tint with the finishing coat of the Parian, with a view to avoid the glare of the natural white colour, and painting hereafter. Certain experiments were tried, and it was found that, with a backing of Portland cement and a setting coat only of Parian, a more uniform tint was produced than by using Parian throughout. Although great care has been taken in the manipulation, the result is not wholly satisfactory. Had we been able to wait until the walls were completely dry, a more uniform tint would probably have been produced.

The ward windows are constructed in three divisions, as shown on sections, the lower part being hung to open in the usual way, and the upper sash drops to the depth of the transom, which is quite sufficient for clearing the upper stratum of air in the wards. The whole of these sashes and frames and the greater portion of the doors were made in Sweden, by the firm of Messrs. Eckman. My assistant, Mr. Harris, went purposely to Sweden to inspect the works, and brought back a most satisfactory report of the machinery, drying chambers, and general capabilities of the establishment for turning out good work, and the result has fully justified the confidence placed in them.

The ground floor of one of the pavilions has been used as a drying-room, by building up temporarily the various openings, in which all the floor-boards and other joiner's work have been thoroughly seasoned. One of the many newspaper critics, seeing these openings built up, regretted that the governors were unable to utilise the whole of the hospital, and that some of the wards have consequently been built up. A little inquiry would have enlightened him and explained the reason of the temporary blockade.

In designing the joiners' work, all mouldings and quirks have been dispensed with as far as possible, as such parts only afford harbour for vermin. The wainscot floors are tongued with hoop-iron, the nail-holes stopped with coloured putty, and prepared for waxing and polishing. The windows of the pavilions are glazed with plate-glass, with a view to a more equal temperature, and the corridors are glazed with flatted crown.

It was determined to depend as much as possible on natural ventilation, avoiding all costly arrangements and fanciful theories, at the same time providing the means of changing the air during cold and boisterous weather and at night. The main extraction-shaft is carried up in the well-hole of the staircases, and in this is placed the smoke-flue from the boiler, consisting of a wrought-iron tube 15 in. diameter. The boilers for warming purposes would not of course be available in the summer, but the furnace for the supply of hot water and baths would be continuous in its operation. In the upper part of this shaft are also placed the hot-water cistern, and, if found necessary, hot-water coils will be added to assist the rarefaction. Shafts are carried from the ends of all the wards, both at the ceiling and floor level, and from the centre at the stove-shaft hereafter mentioned, communicating with a horizontal trunk in the roof, which trunk is connected with the heated shaft previously referred to. To replace the air thus extracted, fresh air is introduced by means of zinc tubes laid between the "Dennett" arching and the floor boards communicating with the stoves and hot-water coils, thus passing over a cool surface in summer, and tempered in winter by contact with the heated surfaces before entering the wards, the whole admitting of regulation by valves. Each pavilion has its independent means of warming and ventilating, avoiding as much as possible all complication in the arrangement, but the pipes are so arranged that in the event of a break-down in any one block, its neighbour can come to its assistance during its temporary failure. A chamber is formed under the ceilings of the corridor in basement and ground floor, into which the whole of the rooms in the low intermediate buildings forming the out-patients' and casual departments are ventilated, and this chamber communicates at each pavilion with the main extraction-shaft before described. The wards generally are warmed by three open fireplaces, aided in cold weather by an auxiliary system of hot water. The corridors and staircases are also warmed by hot water. The open fireplaces stand in the middle of the wards, with vertical shafts. These fireplaces might have been arranged against the outer walls, but bed-space would thus have been sacrificed. The stoves might have been placed as they are, but with descending flues to the outer walls. This, however, would have involved great complication in the arrangement, risk of smoke, and difficulty in sweeping, and the piers, already small enough, would have been so riddled with flues that they would have been unequal to carry the weight imposed. It was therefore thought best to carry up a vertical shaft throughout. It may detract somewhat from the appearance of the wards, but it has, I think, great compensating advantages. The shafts are constructed, as shown on the drawings, with an outer case of cast iron, and an inner wrought-iron smoke-tube, 15 in. diameter. The hot metal does not, therefore, come in contact with the atmosphere of the wards, but the space between the two tubes becomes an efficient ventilating shaft which is connected as before with the main trunk in roof. The smoke-

tube is carried down to the basement, and will be swept from below without disturbing the wards. The whole arrangement is capable of easy removal for repair. A cast-iron socket is built into each floor, supported on two small bearers running from girder to girder, and the "Dennett" arching is made good to the same all round, thus avoiding any communication from floor to floor. The outer casing is of cast iron, put up in pieces and bolted together, and is easily removed at any time, should it be necessary to repair the smoke tubes. In the upper story the iron casing is discontinued, and a brick casing built on the concrete floor, which is more convenient for passing through the roof and carrying the external shaft. It will be observed that the three stoves go into one flue. This is made of ample dimensions, and a valve is provided at each stove to close the connexion with the flues when the stove is not in use. As far as it can be tested in the present unfinished condition of the work, the arrangement works satisfactorily. The stoves are formed with an air-chamber at the back, having a large heating surface of metal (but which cannot be heated sufficiently to vitiate the air), standing in a pan of water, somewhat similar to the Gurney stove. The ventilation of the watercloset and lavatories is entirely independent of the wards, and is carried up the shaft in the river turret, in which are placed the hot-water tanks for supply of baths and coils. The stone shafts at the angles form the termination of the foul linen and dust-shoots, which are carried right up to the external air. The ventilation of the museum and school-buildings is on the same general principle, the ventilating and smoke shaft being contained in the tower at the southern end of the building. The whole of the warming and ventilating works have been most satisfactorily carried out by the well-known and experienced firm of Haden & Son, of Trowbridge, and I am glad to bear testimony to their ability and the careful and considerate attention to all works entrusted to them.

The risk of fire is reduced to a minimum; but considering that an alarm even of fire would act most injuriously on many cases, a system of fire-mains and cocks is provided throughout the building. The cocks admit of being served either from the rising main or from the large tanks provided in the towers. A special main has been laid by the Southwark and Vauxhall Company to supply the building, and a constant service will, it is expected, be supplied; but in the event of any accident happening to the main, provision is made by an arrangement of back valves to supply the fire-cocks from the tanks. These arrangements have been carried out by Messrs. Shand & Mason, whose name is a guarantee of their efficiency. The gas services have been executed by Messrs. Strode, and although not calling for any special description, I may say that they have been carried out in the usual satisfactory manner by that firm.

The lifts, of which there are one in each pavilion, demand a few words of explanation. They are constructed upon the hydraulic ram principle. A boring was made to a depth of 70 ft., and lined in the usual manner for about 22 ft. through the gravel, with cast-iron cylinders to keep back the water; and from this point to the bottom, through the clay, the well is lined with brickwork. In this well is sunk a cast-iron cylinder, 11 in. internal diameter, strongly bolted together in 9 ft. lengths; and within this again comes a hollow ram, 9 in. diameter, working through this cylinder, screwed together in 9 ft. lengths. On the top of the ram the ascending-room is attached, consisting of a strong iron frame with iron roof, all strongly trussed together, and lined with match-boarding. At the top and bottom of this room, on each side, are V guides, lined with gun-metal, the top ones having springs, to prevent oscillation or sudden shocks. At each side are suspending irons, to which are attached strong chains, passing up a groove in the brickwork and over wheels, 3 ft. 8 in. diameter, to the counterbalance; on each side these counterbalances work in recesses, and are grooved to run in guide-irons. The guide-bars for the ascending rooms are of cast iron, placed the whole height, to insure a steady movement. A gear-rod passes through the cage to control the lift, and self-stopping gear is attached. The lifts are worked by fall of water from large tanks fixed in the roof of each block, 104 ft. from basement, each tank containing 2,500 gallons. The stroke or rise of each lift is 63 ft. The pressure of water is 45 lb. per square inch, and the lifts are calculated to raise six persons each time. This principle has been adopted as affording the most perfect safety attainable. The over-head gear is placed at the sides, in a chamber specially provided, so that in the event of any fracture thereof, no damage would arise to the cage. There is also one food lift to each block. They are upon the rack and piston principle. The machinery which is in the basement consists in each case of a cylinder, 11 in. in diameter, with piston and rack working in it, with tooth wheel and large drum wheel, on which is coiled the wire lifting-rope, passing to the top of the building and over a one-grooved pulley to the cage, which has guides top and bottom; this cage runs in T iron guides, fixed in each side of the walls, from top to bottom of the lift-hole. A separate wire rope is attached to the top of the cage, passing over a grooved top wheel to the counterbalance, which is also guided on each side by angle-iron guides. The lift is worked by a rod passing up at the corner and communicating with the valve at the bottom. The weight intended to be raised is 1 cwt. The height is 63 ft., and these lifts are worked from the same tank as the passengers' lifts. They are easily controlled at any floor, and stop themselves at the highest and lowest points. The whole of the lifting apparatus has been specially designed and carried out by Messrs. F. Colyer & Co., engineers, St. Mary's Ironworks, Leman-street, London, the whole of the work being of the most substantial character, and nothing has been neglected to insure thorough efficiency, combined with perfect safety.

The electric communication has been executed partly by Messrs. Reid, Brothers, of the City-road, and partly by Messrs. Moseley; the ornamental ironwork by Messrs. Skidmore; and the cooking arrangements by Messrs. Benham & Sons.

In conclusion, allow me to say a few words as regards the cost. The ultimate cost, exclusive of the site, will probably be about 400,000l., including foundations and fittings, or 650l. per bed, which, in the absence of any detailed explanation, appears to be a large sum; but if all extraneous buildings are allowed for, and the cost of one pavilion taken which accommodates 111 beds, it will be found that the amount would be reduced to 250l. per bed; and considering the cubic allowance of space, the number of attached rooms provided, and the character of the work generally, such amount does not appear to me to be excessive. The cost of the building, exclusive of the concrete foundations and the enclosure railing, is about 9d. a cubic foot. The contract, among other things, provides a large medical school building, a building for the training of nurses, large administrative offices for the civil department of the hospital, five residences, and extensive out-patients' department, and the enclosure of eight acres and a half of land, with stone curb and iron railing and parapet walls.

I have now only to bear testimony to the excellent manner in which Messrs. Perry have carried out the work; and to thank Mr. Bullivant, the clerk of works, and all parties who have assisted me, for the zeal and ability with which they have performed their several duties. I fear I must have exhausted your patience by the dry details which I have brought before you; but whatever may be the architectural merits or defects of the building, the magnitude of the structure, and the important position it occupies, renders it perhaps not altogether an unfit subject to be recorded; at all events, you will all agree with me in the expression of a hope that it may be effectual in alleviating the sufferings of the poor, and in advancing the noble art of medicine and surgery.

OWEN'S COLLEGE, MANCHESTER.

THE new buildings for Owen's College are in course of erection on the west side of Oxford-road, Manchester, from the designs of Mr. Alfred Waterhouse. The style of the buildings is Collegiate Gothic of early type. The walls will be faced throughout with York stone, and the roofs covered with slate. Over the centre roof will rise a lofty flèche to be used for purposes of ventilation. A similar feature, but lower, will rise over the Chemical Lecture Theatre. The staircases are arranged in large octagonal bays, 33 ft. by 14 ft. and cut off from the corridors by arcades of double columns. The floors of the buildings throughout will be on the Dennett-arch principle.

The scheme includes a main block upwards of 300 ft. in length, set back about 200 ft. from Oxford-road, and running parallel with it; and it is this portion that is being erected, and which we illustrate in our present number. It is intended that this should ultimately form the western side of a quadrangle or court, 200 ft. in length by 100 ft. in width. The three other sides will not be enclosed at present, but when the entire scheme is carried out there will be a Natural History Museum on the south; a Library, Examination Hall, and other departments on the east (Oxford-road front); while to the north there will be space for additional lecture and class rooms, or for the Medical School.

In our volume for 1870,* we gave a full description of the intended buildings. We repeat, however, some of the chief particulars.

At the rear of the main block is a large space of irregular shape, on the south of which (Burlington-street side) the chemical laboratories are being erected in a detached building; while on the north ample space will be left for an extension of the laboratories, if needed; for various subsidiary buildings; and for a gymnasium.

The main block contains the various lecture-rooms, class-rooms, &c. Each half is approached by a separate staircase, entered from a porch on the east side.

As the full development of the scheme is reserved for the future, some ingenuity has had to be exercised to make temporary provision for wants which will be more adequately met when the whole of the buildings contemplated shall have been erected. Thus one large arts class-room, not required as such at present, will be used as a temporary library; another large room, in the basement, will form a temporary dining-hall.

The southern extremity of the building is devoted, on the basement and ground floors, to the chemical theatre, a room 66 ft. by 40 ft. The Professor's table is at the western end, on the level of the basement floor. The floor of the theatre rises eastwards until it reaches the level of Oxford-road. The other principal rooms on the ground floor will be the engineering drawing-room and lecture-room; natural philosophy rooms; a large arts class-room, with rising floor; the board-room; and secretary's office. On the first floor there are three large arts class-rooms, Professors' rooms (which for the most part are common rooms), the temporary natural history museum, temporary library, students' reading-room, and various small arts class-rooms.

The chemical laboratories already mentioned will form a block 95 ft. square. There are two large laboratories placed side by side, each of them 70 ft. by 30 ft., and 22 ft. in height. There are store-rooms below, and various subsidiary rooms adjoining the laboratories.

The stories will be, except in special parts, of the following heights from floor to ceiling:—Basement, 15 ft.; ground-floor, 17 ft.; first floor, 17 ft. 6 in.; rooms in the roof, 10 ft. The chief exception is the chemical theatre, which averages 28 ft. in height, and some of the large arts class-rooms have been made about 22 ft. high.

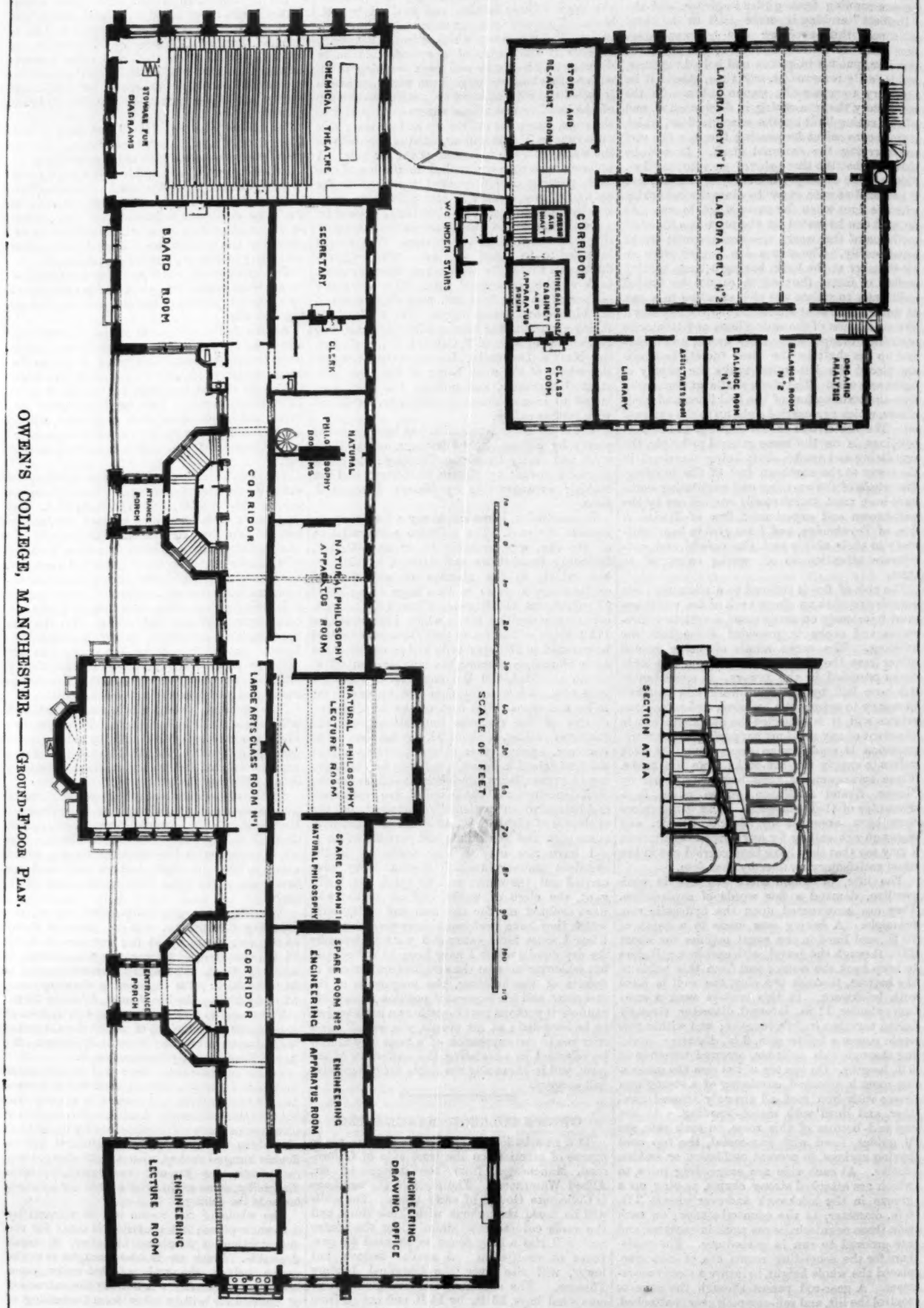
The four large arts class-rooms are of the following dimensions: one of them 40 ft. by 45 ft.; two, 40 ft. by 33 ft.; and one 31 ft. by 35 ft.; that devoted temporarily to the library is 40 ft. by 45 ft. The students' reading-room is 34 ft. by 33 ft.; the engineering drawing-room, 52 ft. by 31 ft.; the board-room, 37 ft. by 30 ft.

There are in the buildings now in course of erection 90 rooms in all, of which the Chemical department takes 28; Natural Philosophy, 9; Arts Class-rooms, 9; Engineering, 8.

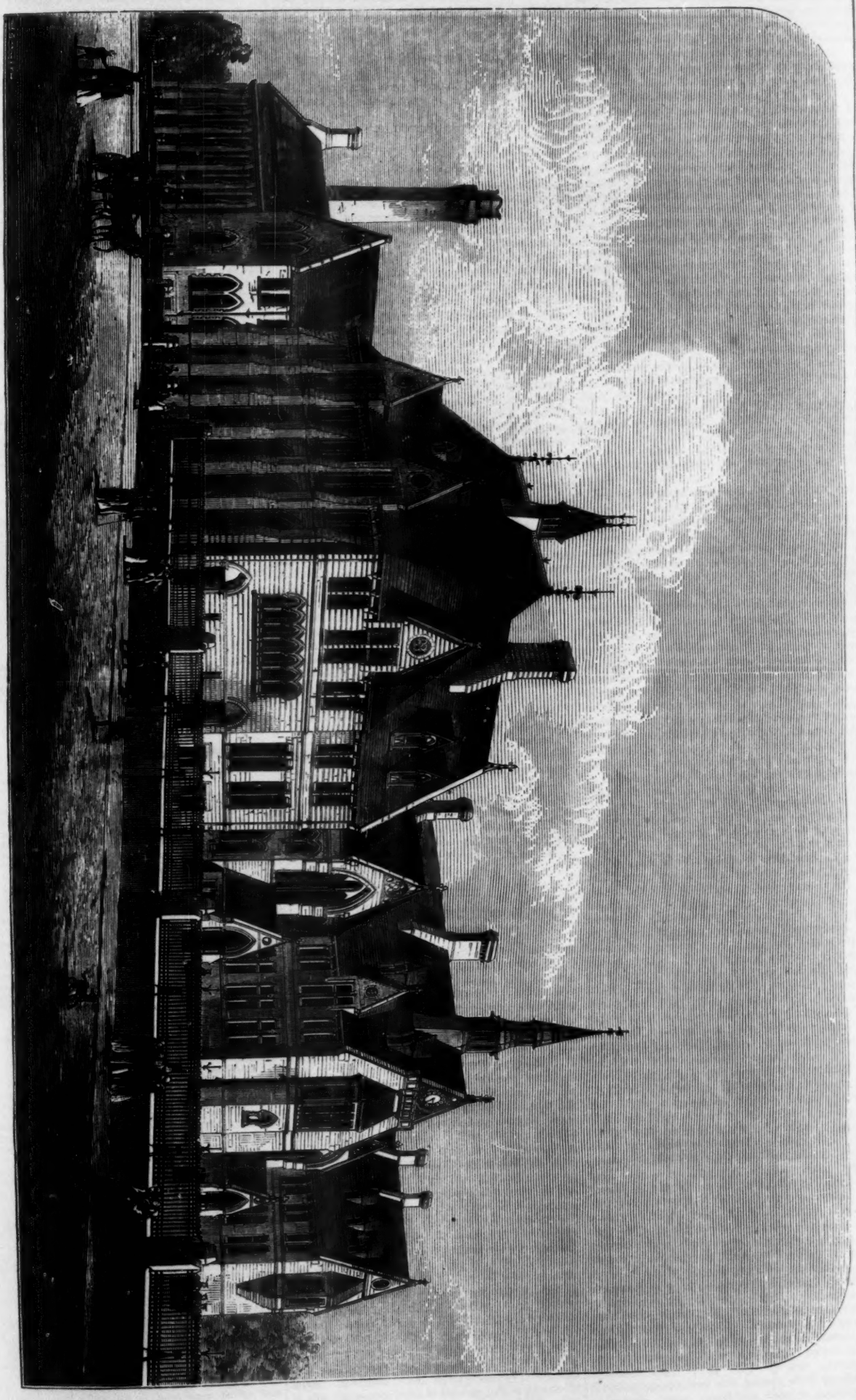
In the sub-basement there will be hot-water boilers and a steam-engine; the latter to drive a fan for forcing fresh air (warmed in winter) into the corridor and lecture theatre. In the ordinary class-rooms there will be openings for ventilation above the doors, and all the windows will be double hung as sashes, with a light above, hung on pivots, for summer ventilation, to open diagonally, so as to throw the fresh air upwards towards the ceiling.

The whole of the rooms will be warmed by hot-water pipes; but provision is made for the introduction of fireplaces hereafter, if found desirable. Fresh air is also brought into the rooms behind the coils of hot-water pipes wherever practicable. A flue for the extraction of vitiated air will be taken from the ceiling of each room into large shafts in the roofs leading to ventilating turrets, in which steam cones will accelerate the draught.

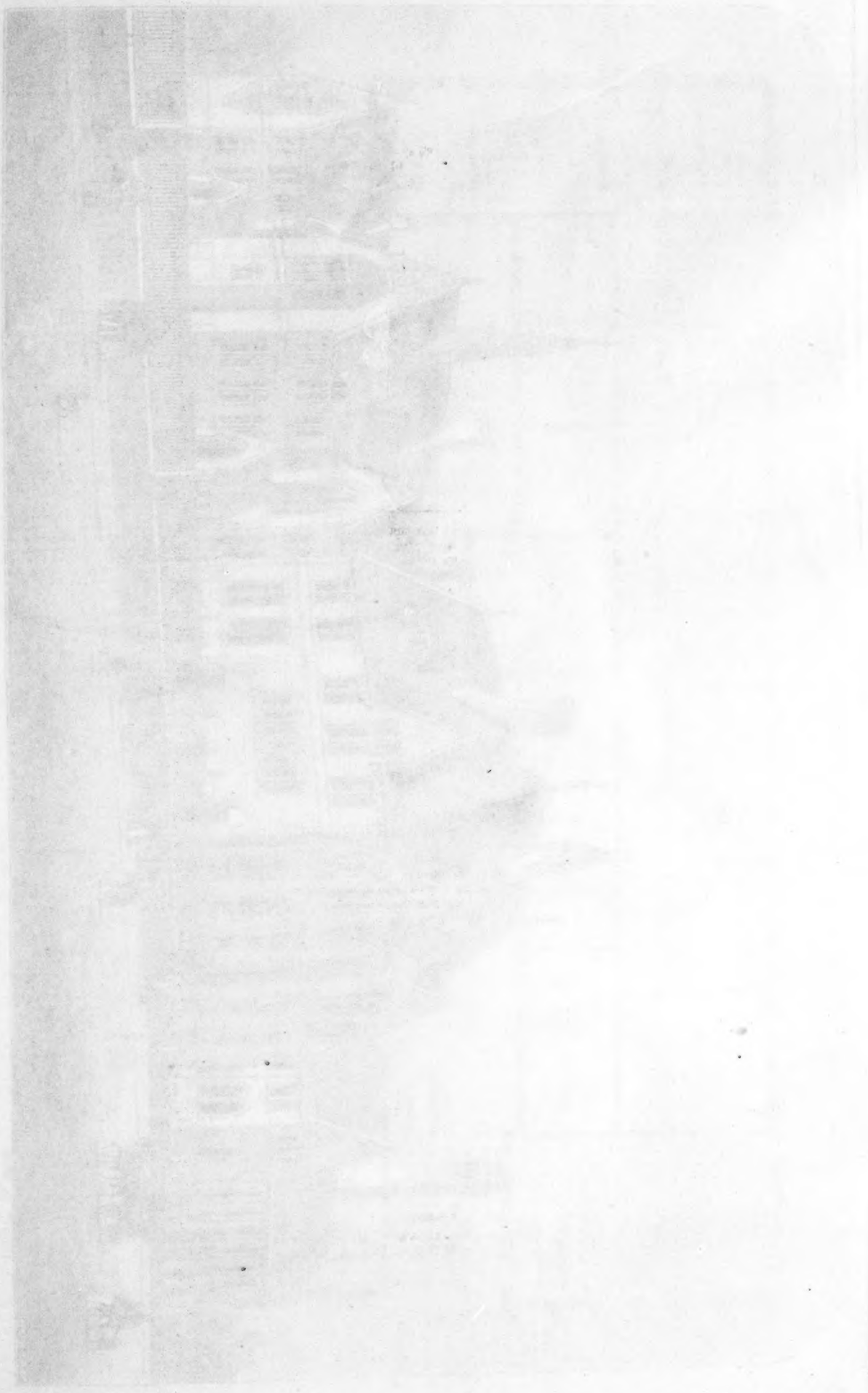
* Vol. xxviii. p. 281.



OWEN'S COLLEGE, MANCHESTER.—GROUND-FLOOR PLAN.



OWEN'S COLLEGE, MANCHESTER.—MR. ALFRED WATERHOUSE, ARCHITECT.



VOLUNTARY ARCHITECTURAL EXAMINATION.

IN August last, a report was received by the council of the Institute of Architects, submitting the following opinions:—

"Proposal 1.—That it is expedient to appoint a standing committee of the Institute, to take charge of the examination, and to act subject to existing regulations; such committee to consist of past examiners and moderators, and other members qualified to deal with the subject.

Proposal 2.—That it is desirable that the examination be divided into two sections, and that candidates be permitted to pass in one section at a time, or in both, at option; provided that in either case he pays the full fee (of four guineas) for each year.

(Note.—This stipulation for the payment of fees in full, appears to offer the best practical inducement to candidates to submit themselves, if possible, for both sections in one year. It might also be expedient to allow to the competitor who passes both sections together, a certain concession in respect of the minimum of marks required to pass.)

Further, that the said two sections may be designated the Artistic and the Scientific sections, and that the following divisions of subjects may probably be found convenient, the titles of the subjects, and the number of hours devoted to each, being the same as those adopted for the Class of Proficiency in 1870, with only three variations, viz.,—the separation of geometrical drawing and mensuration, the introduction of perspective as a special subject, and the addition of probationary work of practical bearing in the scientific department.

ARTISTIC SECTION.

1. Probationary Work, as at present, prepared beforehand.	
2. Design, as at present, but including details and notes of specification.....	10 hours.
3. Geometrical Drawing, as at present.....	2 ,,
4. Perspective	4 ,,
5. History and Literature, as at present...	4 ,,
Total	20 ,,

SCIENTIFIC SECTION.

1. Probationary Work of practical bearing, to be produced beforehand.	
2. Mathematics, as at present	3 hours.
3. Mensuration, ditto.....	2 ,,
4. Professional Practice, ditto.....	4 ,,
5. Physics, ditto	4 ,,
6. Materials, ditto	6 ,,
7. Construction, to take the ordinary form of questions, instead of detail drawings, &c., of the design	6 ,,
Total.....	25 ,,

Further, that each of these two sections may have appropriated to it one whole week, on the following, or a similar plan:—

Monday Afternoon	4 hours.
Tuesday Morning.....	3 ,,
,, Afternoon	3 ,,
Wednesday Afternoon	4 ,,
Thursday Morning	3 ,,
,, Afternoon.....	3 ,,
Friday Afternoon.....	4 ,,
Total.....	24 ,,

(Note.—If twenty-two hours, for example, were determined upon as the time for each week (being two hours less than the above), this would enable the artistic section to have two hours more than the total before set forth, which seems desirable; while the scientific section would be relieved of three hours, which seems also desirable. But all such details, as well as the classification itself, might be left to the proposed committee).

Proposal 3.—That with a view to afford facilities for students in the preliminary examination, it is desirable that this examination should be held in such provincial towns throughout the United Kingdom as may have resident therein a sufficient number of fellows of the Institute willing to conduct the examination and to make efficient arrangements for authenticating the work of the candidates, in accordance with the regulations and to the satisfaction of the council and the proposed committee.

(Note.—This is the whole extent to which it is considered expedient at present to attempt the introduction of the principle of provincial examinations, but it is to be hoped that this measure would gradually result in a large number of architects' pupils throughout the country becoming matriculated students of the Institute, who would thus be induced to come forward in due time for the proficiency examination.)

Further, that every such passed candidate in the preliminary examination should be entitled to the privileges of a student of the Institute for three years following, including the presentation to him of a copy of the sessional papers, upon his satisfying council annually of his progress in study.

Proposal 4.—That a candidate who passes the proficiency examination with great credit, as indicated by the number of marks, should have a record of "merit" introduced in his certificate. But if any candidate, after having passed the proficiency examination, in both sections, should desire to obtain a certificate of distinction, he must pass a special examination, and prove very high attainments in the leading subjects of either the artistic or the scientific section.

Proposal 5.—That the certificate of proficiency should be given only to those candidates who have passed the examination in both sections.

Further, that the certificate should, if possible, convey more distinctly than at present the idea of educational qualification for the practice of the profession of an architect, so as to be similar to other professional diplomas.

Further, that passed candidates, if they be members of the Institute, might be advantageously recognised by the title of graduates of the Institute, with or without honours, as the case may be.

Proposal 6.—That it would be desirable to identify the examinations with membership of the Institute upon some such principles as the following:—

Every passed candidate in proficiency to be held entitled forthwith to the special consideration of the council for his nomination as an associate.

In conclusion, the examiners and moderators beg to state that any alterations in the rules or mode of conducting the examination which may be rendered necessary by the adoption of their suggestions, are intended to be applicable to the examination of 1872, and following years, but not that of 1871."

This Report is now adopted, and has been referred to a standing committee, to be charged with the general management of the voluntary architectural examination.

HOSPITAL ACCOMMODATION FOR SHOREDITCH.

OWING to the rapid increase of the small-pox epidemic, the Shoreditch vestry has been obliged to erect a temporary hospital for the district. Messrs. Hill, Keddell, & Waldram, the builders, have had during the last week a number of workmen expediting the erection of a timber structure, on the site of the Hackney-road disused burial-ground, lately occupied as the drill-ground of the volunteer bodies. The building is 100 ft. long, 22 ft. wide, and about 20 ft. high. It is ventilated from the roof by ordinary wooden louvres. It is entirely composed of timber, with a felt covering over the boarding of the roof, and it is well lighted with six windows on each side. The cost of the erection of this temporary shed, independently of fittings, furniture, &c., is 369*l.* odd. As usual, the voting of the supplies for this urgent need was the signal of factious opposition on the part of some of the members at the vestry meeting.

We cannot agree with the wisdom of the vestry, however, in their choice of site. Surely an old disused churchyard was not the proper place whereon to erect such a structure. We do not wonder that the inhabitants in the vicinity of this improvised small-pox shed are indignant at its erection in its unseemly situation. If the epidemic continues to increase, this building will prove altogether too small, and then enlargement will be impossible, consistent with the proper treatment necessary to the recovery of the patients. The providing of extra accommodation for only forty patients, or under, though a measure of relief, is not one including foresight.

We sincerely hope, however, that the vestry, or the parish, will never require further accommodation, and that the serious epidemic with which London is visited will rapidly decrease.

The Bethnal-green vestry and board of guardians, instead of being at loggerheads, should at once set to work in providing hospital accommodation also for the pauper, and ordinary poor and indigent of the parish. To our own knowledge, no district with which we are acquainted requires it worse. The poor are dying in both parishes under notice, dying in the poorhouses and outside of them: they are dying in many yards and alleys a double death, dying of starvation and the small-pox.

A NEW STYLE OF ARCHITECTURAL CRITICISM.

ALTHOUGH it may be thought in this age that we have more than enough of critics for every species of work and composition, yet it is a curious fact that the architectural critic is a being who has still to see the light. We have had many men who wrote accounts of buildings, and many of the papers throughout the kingdom have often a description of some structure in course of erection; yet they show a lamentable amount of ignorance, and no more bear comparison with the criticisms on an author and his book, or an artist and his painting, than an after-dinner speech does with a polished essay. The style of the so-called architectural criticism generally is in the following strain:—"The church is Early English Gothic. It is in the form of a cross, and has aisles, transepts, and a chancel. It has a large handsome tower and spire, 200 ft. high. The porch is in the centre of the front gable, and is surmounted by a beautiful three-light window. The interior is handsomely decorated, and the roof is open. It cost 10,000*l.* Mr. —— was the architect, and Mr. —— was the contractor for the works." Suppose we try how a criticism of a painting, written in a similar manner, would look:—"The landscape painting entitled "Morning" has some purple hills in the background, a green meadow in the foreground, and some cattle grazing beside some willow trees. A brown brook flows past the trees, and in the distance a man is fishing. The picture is 2 ft. high by 4 ft. long. Its price is 500*l.* Mr. —— was the artist, and Mr. —— stretched the canvas and made the frame." Thus we find that the absurdities of our architectural criticisms are not known till we show them by contrast with others, and what is absurd in one instance ought surely to be absurd in the others.

But how is it, then, that such a persistent and ubiquitous race like critics have not entered the arena of architectural criticism?

In the first place, there was no occasion for them. So long as a man does mere mechanical machine-work he does not deserve praise, but as soon as he emits ideas of his own, and works by his brain, then every one is willing to do him honour. No man is praised for copying an essay written by another, but as soon as he composes one himself, then, if there be any merit in it, the public will do him justice. Since the time of Inigo Jones and the Renaissance, therefore, architects have been satisfied to be the mere essay copyers, content, not to give their own thoughts, but the thoughts of ancient Grecians and Romans, Venetians and Frenchmen, whose names have long been forgotten; and as they never aimed at anything higher, of course no critic arose to praise them. There being no occasion, then, for an outsider learning anything about architecture, as the architects themselves knew very little besides the one style they copied from, the latter had it all their own way; and thus, for want of educated critics, such plagiarisms were permitted, and such eyesores were erected, that had anything similar happened either in painting or literature, it would have been enough to drive its professors into everlasting disgrace.

Fancy eminent artists making themselves a name, by painting pictures professed to be partly copied from celebrated works by Michelangelo, Raffaelle, and others. Or celebrated authors writing books which were partly copied from the works of Bacon, Shakspeare, or Milton, and getting great praise for their copying and imitative powers. Yet this is exactly what has been happening in the architectural world for three hundred years, and scarcely a word has been said against it. The great reason why architects have done so is because the names of the men who designed those ancient buildings have been lost. The structures have been considered, not as the work of men, but as a part of nature; and, as nature is considered a great storehouse for art and thought, so these wonderful buildings were looked at merely in the same light, and held to be a vast repository of ideas and details which were at everybody's service. While an architect, therefore, would have no hesitation in saying that he borrowed some feature from the Ducal Palace or Ely Cathedral, he would extremely dislike it to be said that he plagiarized from Pietro Bassegio or Alan de Walsingham.

In the present architectural criticisms no one is ever seriously found fault with, and all get a modicum of praise, in a set form of words, which mean little or nothing. There cannot be life where there is such apathy. It would be much better for architecture if there were more quarrelling and fighting, not among themselves, but with others; more hard things said, and severe things meant. There is no doubt that the over-praise of Turner, to the detriment of all else, by Ruskin, did a world of good to painting; and we would hail with pleasure the critic who should deal similarly with architecture, denouncing the works of some of our so-called greatest architects, and pointedly telling them their faults, their weaknesses, and their ignorance.

Architects unfortunately have no special reputation to maintain, like an artist or an author. How often is an artist violently assailed when, after reaching eminence in figure-painting, he attempts to paint a landscape; or an historian, when he attempts to write poetry. They are quickly told their mistake, and almost forced back into their several departments. Why should it not be so in architecture also? It may be all very well for a country architect, like a country grocer who combines many stores in one, to design everything, from a stable to a church. But a city architect, like a city storekeeper who restricts himself to selling only one class of goods, should restrict himself also to designing only one class of buildings. We could name many well-known architects, whose mansions were admirable, but whose churches were hateful, and *vice versâ*. There is so much to learn in all the different classes of structures, that it is impossible for one man to be proficient in them all. It is only by our architects dividing themselves into classes, such as church architects, house architects, theatre architects,

&c., (just as we have portrait-painters, landscape-painters, and historical painters,) and bringing up their pupils and apprentices only in the one branch, that our art can ever make the progress which we all desire it should have.

Unfortunately such an object cannot be accomplished in a day, for so great is the rage at the present time for money, that no architect, however large may be his business, will ever refuse an order, and send his client to one more versed in the style of building required. Although he prefers to design houses (having given almost all his attention and study to them), yet if a church is offered him, he eagerly accepts it for the sake of the per centage, knowing well that whatever kind of an erection he may put up, there are no critics to cry him down, and blast his name for any future work. Thus have art and the people to suffer for the chaos in the architectural world. Yet if we can read the tendencies which are at present showing themselves in this direction, we may be sure that before this century closes, many of the reforms which are now considered as merely visionary chimeras, will be accomplished and established facts.

Now, then, that the copying era which has disgraced our profession for so many years is at last subsiding (not from any noble motive, alas! but simply because there are no other good styles to copy), and that it is evident there is a great field open for vigorous and enterprising minds, we may hope that a new race of critics will spring up to do it justice,—men who are thoroughly acquainted with every living and dead style of architecture, and yet are largely gifted with that ungivable faculty of common sense; men who will understand, appreciate, and assist the efforts of those few aspiring geniuses who are throwing off the trammels of custom and stupid veneration, and are endeavouring to form a style more worthy of our country, and more in unison with our enterprising and inventive century; men who will give honour where honour is due, and help the architect to restore himself to that high position from which he has excluded himself for so many years.

Nova Scotia. Andrew Dewar.

THE RECENT SALE OF HOLBORN VIADUCT LAND.

Sir,—On the 11th of last November, the City authorities offered for sale by auction certain portions of the lands which they have become possessed of and cleared in forming the Holborn Viaduct. Out of curiosity I attended the sale, and now send you, with the utmost brevity at my command, such details as I noted. The question of waste land in London is becoming so important, whether from a ratepayer's point of view, or a London improver's point of view, or a mere inhabitant's point of view, that you may perhaps deem the particulars now sent of sufficient importance for a place in your valuable columns. The lands were offered on building leases of eighty years, and the biddings were all rental biddings. Thirty-one lots were put up.

Lots 1 to 4 face Farringdon-street, and are situated on the east side of that thoroughfare, close to the south of the Viaduct. They run from Turnagain-lane to the bridge stairs.

Lot.	Feet Frontage.	Feet Superficial Area.	Reserve, or Selling Rental.
1	22 to Farringdon-street, 50 to Turnagain-lane	1,050	£75
2	20 to Farringdon-street	900	55
3	20 ,, ,, ,,	760	50
4	20 ,, ,, ,,	900	70

Lot 5 was the most important lot in the sale. It is situated at the top of the new street (St. Andrew's-street) now forming from the Viaduct-circus to Fleet-street, and has a frontage of 20 ft. to Holborn-circus, and 52 ft. to the new street. The price fixed for the freehold of this was twenty-seven years' purchase, all the rest of the lots in the sale being twenty-five or twenty-six years' purchase. Lot 6 adjoins lot 5.

Lot.	Feet Frontage.	Feet Superficial Area.	Reserve Rental.
5	20 to Circus; 52 to Street	1,588	£350
6	20 to Street	850	100

Lots 7 to 12 face the Viaduct, and are situated in its north side, occupying the front of the piece of ground between Messrs. Fearon's premises and Shoe-lane, lot 7 being next to Messrs. Fearon's, and lot 12 next to Shoe-lane.

Lot.	Feet Frontage.	Feet Extreme Depth.	Feet Superficial Area.	Reserve Rental.
7	20 to Viaduct	45	810	£120
8	20 ,, ,,	55	905	125
9	20 ,, ,,	65	1,180	145
10	20 ,, ,,	66	1,310	160
11	20 ,, ,,	69	1,373	170
12	21½ to Viaduct, 73 to Shoe-lane	73	1,400	200

Lots 13 to 21 are situated in Charterhouse-street (the new street from Holborn-circus to the Meat-market), and occupy the whole of the south side of that street, from Messrs. Fearon's back premises to Shoe-lane. The backs of these lots meet the backs of other lots.

Lot.	Feet Frontage.	Feet Extreme Depth.	Feet Superficial Area.	Reserve Rental.
13	20	64	1,240	£150
14	20	69	1,350	170
15	20	74	1,460	180
16	20	74	1,400	175
17	20	64	1,187	145
18	20	53	974	140
19	20	43	760	110
20	20	32	546	Unknown
21	65 to Charterhouse-st. & Shoe-lane together	...	738	110

Lots 22 to 26 are in Shoe-lane, at its extreme north end, and on its west side. They lie between lot 21, which has a face in New Charterhouse-street, and lot 12, which faces the Holborn Viaduct.

Lot.	Feet Frontage.	Feet Extreme Depth.	Feet, Superficial Area.	Reserve Rental.
22	20	23	445	£50
23	20	31	610	55
24	20	40	774	70
25	20	49	937	90 (?)
26	20	57	1,100	100

Lots 27, 29, 30, and 31 are on the west side of Farringdon-road, near Charterhouse-street, just where the City has committed the enormous blunder of narrowing noble Farringdon-road; and lot 28 is at the back of lot 27, and has frontages in Charles-street and Saffron-hill. The northernmost of these lots, lot 27, has one face in Charles-street:—

Lot.	Feet Frontage.	Feet Extreme Depth.	Feet Superficial Area.	Reserve Rental.
27	To Farringdon-road, 39 ft. To Charles-street, 50 ft.	...	1,366	£135
28	To Charles-street, 43 ft. To Saffron-hill, 14½ ft.	...	895	55 (?)
29	To Farringdon-road, 20 ft. To Saffron-hill, 20 ft.	84	1,680	125
30	Ditto	...	1,620	120
31	Ditto	...	1,560	115

The result of the sale was that lot 1 was sold, and all the rest of the lots bought in.

Observer.

THE COMPLETION OF ST PAUL'S.

A sermon in aid of the fund now being raised for the completion of St. Paul's Cathedral, was preached last Sunday, at the afternoon service in the cathedral, by the Rev. Canon Liddon, before an immense congregation, which filled the choir and the great space under the dome. The preacher selected as his text the 14th verse of the 5th chapter of Matthew,—"A city that is set on a hill cannot be hid;" and having dwelt on subjects suggested by the text, proceeded to say:—Looking at the past history of our country, St. Paul's has been a central sacred spot in London since London has been Christian. Upon this very site, where, as it would seem, the heathen goddess Diana was once worshipped, as patroness of their sports, by the officers of the Roman Prætorian camp, who hunted in the neighbouring forest, Christ has been now adored for at least thirteen centuries. Here, in the time of the Roman occupation, or at least in the days of the Saxon city, whose walls extended half-way down Ludgate-hill, the great teacher who had preached the unsearchable rules of Christ gave his name to this temple of the Divine Redeemer. Since then it has undergone vicissitudes which it is no part of my business to detail, because this present fabric is, every stone of it, a modern church. The Great Fire of London left a ruin which, after a moment of hesitation, it was found necessary to remove, and the present building has not yet seen its 200th birthday. Now, looking at the matter from one point of view, we might regret that the St. Paul's of our day has no visible connexion with the great cathedral which stood on this site during the most stirring and critical periods in Church history; but from another point of view we may find matter for congratulation that it is of modern origin. It has been said of the Reformation, that whatever else it achieved or swept away, it sounded the death-knell of Christian art. In the centuries which preceded the Reformation the religious use of art had been made the occasion of some conspicuous abuses, and the reaction which reached its limit in the destructive fanaticism of the seventeenth century was, perhaps, more natural than at this day we can entirely understand. But to this criticism I dare to say that the Cathedral of St. Paul's is a magnificent rejoinder. The rebuilding of the cathedral after the Great Fire of London was not the work of this city alone, but of the whole church and country. It was announced in letters patent; it was carried out by contributions from all parts of the kingdom, and by the taxation of London and Westminster. It was re-erected, according to the letters patent, "to the glory of God and for the promotion of the divine services therein to be celebrated." It was "to equal, if not to exceed, the magnificence of the former cathedral church when in its best days, and to become much more than formerly the principal ornament of our city and an honour to our Government and realm." And this was not far from being achieved when it seemed as though the great work—the consummate effort of its architect, Sir Christopher Wren—was to be lost, after all; and that when St. Paul's had reached a point at which, for its exquisiteness of external form, it stands alone amongst the churches of Europe, it was denied all that was to be gained by ornamentation and colouring. I will not dwell on the mistakes and petty jealousies which dashed the hope of the great architect, since they have been described by one whose name can never be mentioned here but with honour—the late Dean Milman. Doubtless this latter church has glories of its own—some that are attested to by its monuments, some that live only in history, some that you who are now close to the dust of Nelson and Wellington need not to be reminded of.

The question is whether the work of Wren is still to continue an unclothed skeleton—whether the seventeenth century, with its infinitely poorer resources of wealth and art, is still to reproach the nineteenth, with its purer and stronger enthusiasm for God's honour—whether this city, set on a hill before England and before Europe, is to be continuously conspicuous, not merely for the high eminence of beauty at which its structures aimed, but for the utter failure to attain it. . . . Taken altogether, St. Paul's is the most important ecclesiastic building in this country. I do not say it is the most beautiful. That is a question of taste, and I do not dispute the glories of Lincoln, and Durham, and Westminster. They belong to a different category of beauty; and while they may be fitly compared with each other they cannot be compared with St. Paul's. Nor do I say it is first in ecclesiastical rank. It is, as we all know, subject to the metropolitan church of Canterbury, and it cannot of itself, as do York or Canterbury, claim the rank of a metropolitan church. But apart from these questions of taste and precedence, the superior importance of St. Paul's lies in this simple and most pregnant fact—that it is the cathedral church of London, of this mighty city, the capital of England, the capital of this vast empire, the capital, in some respects, even of the whole civilised world. St. Paul's is a representative Christian church; nor are its outward form and fabric unworthy of its position, as its mighty dome towers above all the surrounding mass of buildings, and even not seldom above the dense atmosphere, that attests year by year more and more surprisingly the onward march of your vast industrial civilisation, and thus lifts high into the upper skies the symbol of our Lord's own work, and seems silently to continue the

great apostle's determination to glory only in the cross of our Lord Jesus Christ. It is a public advertisement, seen and understood by all of the power and triumph of Christianity. . . . .

It is marvellous that the English people, whose bridges, and palaces, and senate-houses, and quays, and railways, and streets, and viaducts are so numerous—that this English people, so truly imperial in its conceptions, so prodigally lavish of its wealth when this world and its wants are in question, should be so little capable of rising to the level of moderate generosity when it stands on the threshold of the next.

It is for you to say whether another generation shall pass away, leaving St. Paul's as it is; or whether, by your present efforts, and by your persevering interest, a most important step is or is not to be taken in our day towards making this church worthy of its great position in the metropolis of England and in Christendom.

DANGEROUS STRUCTURES: BUILDING ACT.

AT Guildhall, the Rev. Dr. Stebbing, of Hampstead-road, was summoned before Mr. Alderman Stone, as the proprietor of the house, No. 5, Fish-street-hill, to show cause why an order should not be made on him to pull down and rebuild the party-wall of that house, which was dangerous to the public.

Mr. Baylis appeared in support of the summons, which was taken out by the Commissioners of Sewers. He said that some time ago the Metropolitan Board of Works pulled down a house next door to Dr. Stebbing's house and left the party-wall in a very unsafe state. The board had shored it up, so that there was no immediate danger, but from the fact that some houses had fallen recently in Thames-street the Commissioners of Sewers had felt it their duty to apply for a peremptory order to have the necessary repairs done. They had also summoned the Metropolitan Board of Works, as it was alleged that they had an interest in the ownership of the party-wall.

Mr. Goddard, surveyor to the Metropolitan Board of Works, said that he attended out of respect to the Court to say that the Board had no interest whatever in the party-wall.

Evidence having been given as to the state of the wall and to the service of the proper notices on the owner,

Alderman Stone made a peremptory order for the repairs to be made immediately.

METROPOLITAN BUILDING ACT CASES.

DISTRICT SURVEYOR'S FEES.

IN the month of March, last year, a person signing his name James Roots, builder, Catherine-street, Poplar, sent a proper notice, on a form approved by the Metropolitan Board of Works, to the district surveyor of Bow and Poplar, and therein stated his intention to erect two office buildings, at Dingle-lane, Poplar. The buildings were erected as stated in the notice, and duly surveyed by the district surveyor. Several weeks after the buildings had been completed, on the 23rd of September last, a bill was sent to the address given on the notice, in a registered letter, of the amount claimed (1*l.* 10*s.*), but the letter was refused, and returned through the post. The district surveyor's clerk afterwards called at the address several times, to inquire into the matter, and to apply for payment of the charges, when he was informed that the buildings had belonged to Mr. Roots, and that the James Roots living at Catherine-street had not sent any notice,—knew nothing about it or the buildings which had been erected at Dingle-lane. In consequence of this remarkable circumstance, a summons was taken out at the Thames Police Court, and after two adjourned hearings, before Mr. Paget, on January 19th, it was proved to the magistrate's entire satisfaction that the James Roots mentioned in the notice was the builder, that he had been seen giving directions to the men actually doing the work, that he had also himself assisted in the erection of the buildings, and had brought several of the materials in his cart to the premises. The magistrate considered it as an attempt at imposition, and ordered the defendant to pay the amount of the claim forthwith, with the costs of the summons and witnesses, and the attendance of the district surveyor on each occasion, or in default one month's imprisonment. The money was paid.

DANGEROUS STRUCTURES.

SIR,—Your well-timed article as to the catastrophe in Thames-street, and cogent reasons for the district surveyor's performing a necessary duty as to the buildings in the City, induces me to call attention to some houses in Widegate-street especially, and the houses in that district generally.

Having occasion two or three times each week to pass through the above street, I have been surprised that the City authorities have not ordered the demolition of those premises, as has been done in the case of the houses in the same street nearer to Bishopsgate-street. The neighbourhood of Widegate-street, as well as that street itself, is most densely crowded, and that by the poor and industrious classes, and your notice of the state of the buildings there may awaken the authorities to the necessity of action.

OBSERVER.

SLATE CISTERNS.

SIR,—I have lately put up a slate cistern, of 1¼-in slab, 1 ft. 6 in. deep, which covers a W.C. and lavatory, and forms a complete roof to the same, and is open to the atmosphere; the cistern is carried on iron girders, wood joists between it, and lath and plaster to which forms ceiling to W.C. and lavatory. Since the building has been erected and completed, which was done during the heat of last summer, and as rain and damp weather came on, there has been found a continual discharging of water on its under-side, and running through the ceiling and down the walls. On taking down the plaster ceiling, and applying charcoal fire, I find that the joints of the cistern are all quite tight, and that the water comes from no one or two places, but commences as a mist all over the cistern, and increases until perfectly loaded, and then discharges itself and runs down. I find this continues to be the case when left to its natural temperature. The question I want to know is, is it possible that the water can sweat through a 1¼-in. slate slab, and thus collect on the bottom of the cistern? And is it possible that two small rooms, of 5 ft. square, with a small air-brick near the bottom of the cistern, for the purpose of giving it air, as fixed in the walls for that purpose, can supply a vapour sufficient from the air to cause such a constant discharge of water. I find it quite dry in frosty weather. Some practical information on this matter will very much oblige

A BUILDER IN A PUZZLE.

KITCHEN BOILERS.

SIR,—We have lately been schooled into various modes of preventing the bursting of kitchen boilers, and many suggestions have been made, requiring an entire change of the usual water-fittings in dwelling-houses. One of the simplest and most practicable plans that I have seen noticed is that of allowing the water-taps to drip during frosty weather. This being not only waste of water (sometimes extremely scarce in such a season as we have been lately experiencing), but also entails trouble, or is a tax upon the memory. We may remedy the former, but should not trouble ourselves about the latter. I have long since, indeed for years, adopted a very simple remedy. In nearly all houses in large towns supplied with water by public companies, there is a stop-cock where the water-pipe first enters the house. I have had attached to the pipe two small taps, one at each side of this stop-cock. On frosty nights I turn off this main cock, then open the one nearest the entrance from the street, to allow a small drop to run from it; this will not freeze so long as you keep it running. I next empty all the pipes through the house by opening all the taps, and as the stop-tap prevents their running, I open the other small one near it, which gives vent to the whole. Of course when the pipes have to be refilled next day, the two small taps are turned off, and the main stop-cock turned on.

SUB.

SEVERAL manufacturers have devised means to prevent the bursting of kitchen boilers in the event of accumulation of steam, and have sent us particulars. We can only specify them:—

Messrs. Tylor & Sons make an improved dead weight safety-valve, not dependent upon any lever or hinged joint.

Mr. Geo. B. Cooper has registered a safety hot-water circulator, for insertion within the back boiler of kitchen ranges, bath supply, and hot-water services. It consists of a cast-iron group of narrow water passages, forming a condensed continuous line of heater from inlet to egress, and is immersed in the boiling water of the back boiler of the kitchen range, which is open by communication with the small service cistern.

Messrs. Waterson & Co.'s plan consists of an iron tube screwed on to the up or down pipe near the range: the water enters at the bottom and comes out at the top of this tube. The tube is a cylinder, and open top and bottom, with a jet of gas burning through it, the whole thing being not unlike an Argand lamp-glass, only the glass being hollow iron. "The heat given to the water causes a strong circulation through the pipes, and makes it impossible for them to freeze."

And Messrs. Roper & Russell have patented a valve in the shape of a thin diaphragm of copper fixed over a hole cut in the top of the boiler, which splits in the event of undue pressure, and lets off the steam and hot water by means of a pipe above the diaphragm.

HOLLOW BRICK WALLS.

SIR,—In your impression of the 21st January a correspondent, "asking for information as to the construction of hollow walls," objects to the use of "brick ties," which, he asserts, will convey the moisture "in vertical lines, just as if the wall was solid brick, which, in fact, it becomes at the tie."

His assertion is not based on fact, and if left uncontradicted, may prevent many in the future from enjoying the luxury of living at any season (more particularly such a one as the present) in a house constructed with hollow walls, and unaffected by external changes.

A house is defined as "an enclosed space," and I see safes may be so defined; and the film of air, which by its influence prevents, to a great extent, our butter from melting in the summer or from freezing in the winter, will also preserve the temperature of all interiors from the ever-varying influences of the weather.

The value of an air space as a non-conductor of heat, cold, or damp, is known to all understanding practical science; and as the patentee of the only "brick tie" employed to secure this great desideratum, which your correspondent condemns, I am prompted to address you in its defence.

Sixteen years ago I patented a glazed stoneware bonding brick, of peculiar form. Profiting by the experience of the past, I have more recently patented another form of brick, made of the same material, and of a shape that not only practically prevents the passage of moisture from external to internal walls, but also tends from its form to greatly strengthen any structure in which these "brick ties" may be used.

By their employment hundreds of basements and retaining walls, many of them below the Thames level, have been converted into dry and valuable spaces, for storage purposes. Among these I would more particularly refer to the basements in the docks, now used for the storing of tobacco, and thousands of houses of every class, standing in most exposed situations, all of which are warm in winter, cold in summer, and dry at all times.

These "brick ties," and also those on the same principle in iron, have often been illustrated, and described in the advertising columns of the *Builder*, and to those who desire to know more about them, I shall be pleased to send an illustrated description, showing their application to walls of any thickness.

My whole life has been one continued experiment, and but for the value of your space, I would furnish many interesting results. Permit me to give one as illustrating the advantage of an air space in party-walls in cases of fire.

On an old stone landing I built four walls, the back and one of the side walls being hollow, and bonded with the "brick ties:" the remaining side I built solid, "every course well flushed in." The front was constructed with openings for the admission of air to the fire I proposed to make within this enclosed space.

At the end of three days, the work having become set, I made a fire in the interior, and this I kept up until my solid wall was nearly red hot. At this time the external faces of the two walls, built hollow, were not more than warm, proving that many fires would be prevented from extending, if party-walls were thus constructed. I have also tried other experiments, as to the conduction of sound, with equal success; but hoping soon to be able to publish my experiences in these and other subjects, I will not further trespass on your patience.

GEORGE JENNINGS.

In Hampshire it is the general practice to build hollow brick walls, either two half-bricks with iron ties, or two 9-in. walls with the same. These walls are more effectual against damp than 14-in. solid walls, as in these parts the bricks are so porous as to be like a sieve or sponge, for want of breeze, and are at all times obliged to be battened. In the case in point two 9-in. wal's should be adopted.

W. B. W.

THE PRICE OF EARTHENWARE PIPES.

SIR,—Having for some time represented a manufacturer of sanitary drain pipes, I can fully testify to the good office of your correspondent in ventilating this subject, more particularly for the benefit of country builders and contractors; at the same time, it is due to large manufacturers, as Messrs. Beanmont, Doulton, Knowles, Cliff, Stiff, Millichamp, and others, that they adhere to the set Lambeth list of prices. It is the immense disparity in allowance of discount that forms the greatest detriment to the trade. I may add, that my firm, buying largely for cash, are enabled to sell at lower prices than those quoted by small manufacturers, to whom, I presume, the writer in your valuable journal directs attention.

A MANAGER.

FROM ITALY.

A CORRESPONDENT from Florence writes to us:—Various plans are suggested for the prevention of further inundations in Rome, but none acted upon as yet. The damage done by the last is incalculable. I have heard many accounts of the state of Rome,—the walls of the houses still saturated with water to the height of 2 metres; the *mud* that was cleared out of the shops left in heaps in the streets, instead of being carried away. A friend told me that there was so unhealthy a smell pervading most parts of Rome that he was afraid of staying there. The doctors are advising all those bent on going to go at once, before the sun draws out the malaria. We had a pretty sharp shock of an earthquake on Sunday night. It was severe at Ravenna, and we had only the fag-end of it. They have appointed, after many changes, a young, active man, as minister of public cleansing in Rome (Silvestrelli). The office was refused

by many, the cleansing of the Augean stable seeming too difficult a task to attempt. As to Florence, it is having its last fling of gaiety while it is a capital, and will settle down, after June, into its quondam state. All projects of improvements *begun* are to be finished; all improvements of which the plans are made are to be carried out; those only talked about, not begun, to be relinquished. The Society for the improvement of the town is going to carry on extensive improvements in Rome. I am curious to see what will be done with the Campagna. Italy is certainly making strides in science, but not in literature. Much good will come to Italy by the Mont Cenis Tunnel, the St. Gothard Railway, and the Suez Canal.

MODESTY OF A BOARD OF GUARDIANS.

SIR,—At a meeting of the Portsea Island Board of Guardians, on the 25th ult., one of the subjects under consideration was a communication from an official of the Poor-Law Board, requiring certain information (indicated on a printed form), such as the cubic contents of rooms and wards, and a few other matters equally simple. After considerable discussion, the guardians confessed their inability, without professional assistance, to direct any officer of their union (a large one, by the way) how to proceed to fill up the return asked for. In justice to the guardians, however, it should be mentioned that one of their number (intuitively, perhaps) came to the conclusion, that if the required particulars were not given,—*i.e.*, if the Poor-Law Board did not know whether the laws it was appointed to administer were fulfilled or not,—this same Poor-Law Board would "insist upon adding a new wing to the building, which would involve an outlay of 10,000*l.* or 12,000*l.*" Whilst another gentleman, more logical if less learned, came near to solving the difficulty by suggesting that a schoolboy should fill up the form in question.

My object in making the above remarks, sir, is not to throw ridicule upon gentlemen who devote their valuable time to the public service, but merely to hint that the foregoing example might profitably be followed by other public bodies under analogous but more important circumstances. To illustrate my meaning more clearly,—suppose, for instance, such a slice of patronage as that shadowed forth in the happy thought of the "new wing" falling to the lot of such a Board, and its members candidly admitting their inability to decide, *unaided*, upon the merits of competition or any other designs for accomplishing the object in view, what an advantage it might be to the community! ONLY A BUILDER.

Books Received.

Ancient Irish Architecture, Kilvalkedar, County Kerry. Drawn by ARTHUR HILL, B.E., Architect. 1870.

Templenahoe, Ardfert. By the Same. 1870. 22, George's-street, Cork.

FOLLOWING up his publication illustrating Ardfert Cathedral, mentioned in our volume for 1870, Mr. Arthur Hill has illustrated, in two separate books, the churches of Kilmalkedar and Templenahoe, both small and early buildings, more interesting in an archæological than an architectural point of view, though not without value in the latter respect, too.

The Hiberno-Romanesque building at Kilmalkedar was originally covered with a stone roof, on the corbel or overlapping principle, and the jambs of the entrance doorway slightly incline inwards towards the top. The chancel is later than the nave, though still of the round-arched period. The interior of the nave is decorated with a series of half-round shafts, that divide the side walls into panels immediately below the carving of the roof.

Templenahoe terminated with an apse, now gone. The south window in the nave, which is in good condition, is moulded and surrounded in the inside by a band of elaborate ornament, consisting of a series of conventional flowers and figures, delicately carved. In both cases a number of photographs show the actual (and very ruinous) condition of the building. It is very desirable that careful records should be obtained of these buildings, fast passing away; and all who are interested in the antiquities of the country, especially Irishmen, should aid Mr. Hill in his undertaking, by purchasing his books. It is a pity that his first work was not published of the same size as those now issued, so that all hereafter might range.

VARIORUM.

"THE Sixteenth Annual Report of the Wesleyan Chapel Committee, 1870," just now published, shows that since the Conference of 1869, the committee have sanctioned the following cases:—

138 Chapels, at an estimated cost of		£142,564
16 Ministers' houses	ditto	13,626
28 Schools	ditto	8,409
68 Enlargements and alterations, ditto		30,037
83 Modifications of cases previously sanctioned, at an estimated *additional* outlay of		19,723
27 Organs		5,545
360 total cases.	Outlay	£219,904

Compared with the preceding year, these figures show an increase of 11 chapels, and of 18,838*l.* in proposed outlay; an increase of 3 ministers' houses, and of 2,332*l.* in proposed outlay; a decrease of 1 school, and of 6,450*l.* in proposed outlay; an increase of 23 enlargements and alterations, and of 14,581*l.* in proposed outlay; an increase of 10 modifications, but a decrease of 4,626*l.* in proposed *additional* outlay; and an increase of 8 organs, and of 2,258*l.* in proposed outlay. The number of chapels is the largest sanctioned in any one year; but the proposed outlay has been once exceeded. New schools, built in connexion with new chapels, and settled upon the same trustees and trusts, are not separately reckoned. Upon all the classes of cases sanctioned there is an increase of 54 cases, and of 26,933*l.* in proposed outlay. The report includes views of a number of the chapels and schools that have been erected. The design for the most important, the Scott Memorial in Westminster, site for which has cost about 10,000*l.*, is not one of the best works of its architects, Messrs. Wilson & Wilcox, of Bath. The size of the tower and spire contrasts oddly with the excessive meanness of the side elevation.

——The *Art-Journal*, speaking of the International Exhibition of 1871, says,—"With regard to the foreign contributions, Belgium has applied for a large increase of space; and having obtained somewhat, has asked for more. Sweden and Norway will fully occupy the space allotted to those Scandinavian kingdoms. In addition to the articles they will exhibit under the ordinary conditions, they have engaged to erect a model school-house on the grounds adjoining the galleries, to fill it with their scholastic appliances, and, in fact, to transport to London a working model, or rather, an actual sample, of a northern school. Under the present state of public feeling on this subject this idea is eminently happy, and its accomplishment can hardly fail to secure a great success. The smaller German states will fill their respectively allotted divisions."

Miscellanea.

A Self-Delivering Tunnelling Machine. The Duke of Sutherland, Captain Tyler, and other gentlemen went down recently to Snodland, Kent, to witness the working of Brunton's tunnelling machine in grey chalk. The addition has been just made to it of a self-delivering apparatus, as it was found that hand-labour could not at all contend with the quantity of *débris* produced. The machine operates by revolving cutters, which continually chip away the end of the tunnel. There is no concussion, as every motion of the machine is circular. The *débris* is collected by revolving scrapers, and delivered on to an endless band, which tips it into wagons or barrows at the rear of the machine. The rate of working was 3 ft. 9 in. per hour, and was continued for about two hours, with intervals. The machine was working with only six cutters, and taking a chip of only 1 in. in depth. It has been proved that a chip of 2 in. can be taken as readily as one of 1 in., and twelve cutters can be used. The result would be a speed four-fold that attained; but it was considered that 3 yards an hour in a tunnel of 9 ft. diameter would be as fast as the full wagons could be conveyed away.

New Theatre, Dublin.—Mr. C. J. Phipps writes,—Allow me to say, with reference to your notice of the new theatre about to be erected at Dublin, that it is designed to seat 1,900 persons, not 2,500, as stated.

The Mortuary at St. Mary's, Stratford. This public mortuary and post-mortem room, of which we gave some account before it was erected, has at length been built by the vestry of St. Mary's, Stratford-by-Bow, in the churchyard of that parish. The plans of Messrs. Hill & Fletcher, architects, were followed; and the result is that there is a striking contrast between the wretched ladder-shed in which post-mortem examinations were wont to be held, by the aid of a dark-lantern, and the present erection at the other end of the churchyard. The selection, in the present instance, of the churchyard obviated all difficulty as to site, but presented others from the limited area of ground at disposal and the desirability of avoiding any injury to the general appearance of the church and its surroundings. The mortuary is situated eastward of the church, and is approached by an inclined path with a turfed slope on each side. The parts of the churchyard immediately contiguous have been laid out and planted with evergreens. The building is sunk 3 ft. in the ground, and has an air-chamber running entirely round it, ventilating-grates being inserted at intervals. The walls are of Kentish rag and Portland stone, and the roof of brickwork, cemented: there is also an iron skylight, glazed with rough plate-glass. Internally, the walls are of Portland cement, with smooth face; the floor is of planed slate, and there is a solid slate table for post-mortem purposes. Water is laid on by means of one of Dalziel's patent regulating taps, by which a constant supply is obtained without the uncertainty and loss of space which a cistern necessitates; there are arrangements for drainage also. In the wall of the end opposite the door are brackets for four coffins. The dimensions of the whole are only 13 ft. by 9 ft. The total cost has been about 236*l.* The vestry, thinking it inadvisable that a building chiefly set apart for the reception of dead persons should present an appearance which might from the bareness of its aspect pain the feelings of friends and relatives; and the situation of the building demanding some architectural effect, instructed Messrs. Hills & Fletcher to plan for them a structure meeting these requirements. Hence the cost of so small a building.

Dwellings for the Working Classes.—The directors of the Improved Industrial Dwellings Company, Limited, agreed to recommend to the shareholders the payment of a dividend at the rate of 5 per cent. per annum for the half-year to the 31st December, 1870. The receipts for the half-year amounted to 8,225*l.*, and the payments to 4,486*l.*, leaving a profit of 3,739*l.*, being equal to 5*l.* 19*s.* 7*d.* per cent. per annum. This, added to the balance brought forward from the last half-year, gives a total of 6,040*l.* available for division. The dividend of 5 per cent. will absorb 3,125*l.*, and the directors propose to carry forward the balance, amounting to 2,915*l.* The capital invested is now 180,610*l.*, and the report states that the position of the company's business remains highly satisfactory. A proposal will be submitted to the shareholders at the ensuing meeting to raise an additional 125,000*l.* capital, the whole of the present capital having been invested, and there being a continued demand for improved dwellings by the working classes.

The Gallery of Illustration.—Mr. W. S. Gilbert has again provided Mr. and Mrs. German Reed and Company (Limited) with a successful entertainment in the shape of "A Sensation Novel, in Three Volumes," satirizing with great cleverness productions of that class. Mr. Reed has himself provided some very lively music, and Mr. J. O'Connor has painted as frontispieces three capital scenes, especially a view from the top of the round tower at Windsor, including St. George's Chapel, Eton College, and the Thames. The indefatigable proprietors are assisted by Miss Fanny Holland, Mr. Corney Grain, and Mr. Arthur Cecil, and all sing and act throughout with wonderful energy and relish. The whole thing is what prosaic listeners will call nonsense; but it is very amusing nonsense, and includes two of the best *buffo* songs that have been heard for many a day.

St. James's Hall. — Mr. Henry Leslie announces concerts of unaccompanied music, and his own oratorio, "Immanuel." In these performances Mr. Leslie's choir will be assisted by Madame Viardot Garcia, Mdlle. Titiens, Mr. Sims Reeves, Mr. Vernon Rigby, Mr. Santley, and many others. The first concert will be given on Thursday evening, February 9th.

Small-pox and Fever Hospitals for South London.—Following the opening of the small-pox and fever hospitals at Homerton there was a formal inspection and opening of similar institutions at Stockwell, for the benefit of the South London district. The two hospitals are within one enclosure, and will be this week ready for the reception of patients. The site comprises 7¼ acres, and the dwelling-house, which was included in the property, is now the head-quarters of the medical officers and committee, situate in the centre of the ground. The two hospitals are, in fact, completely divided by it. The small-pox hospital will accommodate 102 inmates, in eight wards, each containing a dozen inmates, and there are two special wards for the reception of three each. The fever hospital will accommodate 72 typhus cases, in four wards of 18 each; 48 typhoid or enteric cases, in two wards of 24 each; and 36 scarlet fever cases, in two wards of 18 each. In addition to these there are 16 special-case wards, each to contain 1 patient. The cost of the two buildings, which are upon the block system, and arranged to afford 2,000 cubic feet of air for each patient is as follows:—Site, 15,500*l.*; building, 50,000*l.*; engineering and heating apparatus, 6,000*l.*; and furnishing, 8,000*l.* Special attention has been paid to the corridors, which are wide and lofty, and in some instances 400 ft. long; while the wards average 100 ft. long, 28 ft. wide, and 10 ft. high.

Metropolitan Board of Works.—At the weekly meeting of the Board, Colonel Hogg in the chair, on the recommendation of the Works and General Purposes Committee, it was resolved, on the motion of Mr. Runtz, "That the Native Guano Company be permitted to erect, at their own expense, for not exceeding twelve months, works at Crossness, for the purpose of treating, by their A B C process, about half a million gallons of sewage daily, subject to the works being carried out to the satisfaction of the Board's officers, and to the effluent water being made to flow into the river by means of an open channel; subject also to the company entering into an agreement to be prepared by the solicitor for carrying the arrangement into effect, and for preventing the Board from being in any manner bound to the company." A voluminous report was presented from the Finance Committee as to the amounts required for the expenses of the current year. The total charge is 260,862*l.* 6*s.* 8*d.* Mr. Richardson explained the different items, and afterwards moved that precepts be prepared on the basis of 3¼*d.* in the pound. The motion was put and agreed to, and after the routine business had been disposed of, the Board adjourned.

The Windsor Surveyorship.—Mr. Brown, the Windsor local board of health surveyor and inspector of nuisances, having been requested to tender his resignation, a memorial from nearly 100 large ratepayers intervened on behalf of Mr. Brown, but, on the mayor's suggestion, it was unanimously resolved that the surveyor should be paid up to the 25th March, and that his services should be dispensed with immediately on the appointment of a successor. The mayor then referred to the steps necessary to be taken for the appointment of a new surveyor, and observed that previously to advertising it would be necessary to decide whether they would have a professional surveyor or a person receiving a small salary. There was a feeling that the office of inspector of nuisances should be given to another person; but that would depend greatly upon the character of the person they selected. A committee was then appointed to consider the subject. Mr. Brown's salary from the Board as surveyor was 140*l.* a year, including 10*l.* as inspector of nuisances; but it was stated on the one hand that he was paid nothing as inspector of nuisances, and on the other that he received 25*l.* a year from the Council, the Bridge Trust, &c.

A Monster "Strike."—A strike of an unprecedented nature has just taken place in the coal-mining districts of Pennsylvania, by which 100,000 men have ceased work. The collieries in the Schuylkill County and the Lehigh and Wyoming Valleys struck work on the 10th of January. Is there no man of integrity to whom both sides would listen, so that such a preposterous mode of settling a dispute might be abrogated?

New Workhouse for Lambeth. — Mr. Crockett's tender, 44,390*l.*, has been accepted, and the works will be commenced at once.

The Stockport Co-operative Society.—The annual *soirée* of this society has been held. The Chairman said,—The time was when they had been short of capital, but now they had 8,880*l.* odd at their disposal, and they could go into the markets of the world. A shilling would make a person a member, and they had paid 7½ per cent., which was more than they could get at the bank, the post-office, or, in fact, almost anywhere else. Mr. T. Spedding said that two or three years ago, when their receipts were 22,000*l.*, he thought they might reach 28,000*l.*, and then he began to fancy they might perhaps get up to 30,000*l.* or 32,000*l.* The past year had, however, passed all his expectations, as they had reached 34,493*l.* He saw from a report of the Sun Mill Co-operative Cotton Spinning concern, at Oldham, that they had paid 6½ per cent. for the quarter. He commended the co-operative plan to those who had not already adopted it; and in reply to those who had a doubt as to the safety of the society, he would only say that it passed through the cotton famine.

Pneumatic Despatch Tubes in Postal Telegraphy.—The Post-office Department have recently adopted an improvement on the old pneumatic despatch tube, of which improvement Mr. Siemens is the inventor and patentee. The operation of the new system was witnessed by a number of gentlemen of eminence in the scientific world on Saturday at the General Post-office, on the invitation of Mr. Scudamore. It has been some time in operation in Berlin and Paris. The new lines of tubes extend from Telegraph-street to Fleet-street, with a station at the General Post-office, and it is intended to carry them to Charing-cross, the Houses of Parliament, and all the central telegraphic stations in the metropolis. The result of the working of the system up to the present time has, it is said, been most satisfactory, the tubes now doing the work of 12 telegraph clerks, and being capable of doing the work of 100 if necessary.

Value of Property.—Messrs. Cobb submitted for sale, at the Sun Hotel, Chatham, the freehold wharf, trade premises, and dwelling-house, No. 61, High-street, Chatham. The premises consist of a wharf, which has a frontage of 25 ft., with a landing-stage of 40 ft. by 10 ft.; extensive stowage, 122 ft. in length, with loft over, and an approach from the High-street. Land-tax, 1*l.* 9*s.* per annum. Mr. Cobb valued the property at 60*l.* a year. The attendance of purchasers was not large. The biddings commenced at 500*l.*; they went up to 750*l.*; the property being sold to Mr. Gill.——Messrs. Moore & Hill offered for sale at the Fleece Inn, Cirencester, about 14 acres of freehold land, at the Foss, South Cerney. There was a spirited bidding, and the property, which was put in at 600*l.*, was eventually knocked down to Mr. William Garne, at 980*l.*, exclusive of timber.

Fatal Building Accident in Fenchurch-street.—A gentleman, named John Frew Royle, having offices in Mark-lane, has died in the London Hospital, from the effects of shocking injuries which he received while walking along Fenchurch-street a few days since. It appears that the front of some premises on the north side of the street, nearly opposite Mincing-lane, are being rebuilt, and the workmen were raising a large stone to the top of the building, when in some way in its progress it displaced a stone which had been set in position, and the stone fell with a fearful crash on to the pavement beneath, carrying away a portion of the scaffolding in front of the premises. The deceased was struck on the head and chest, and received shocking injuries, of which he died. A banker's clerk, who was also passing, was hurt, and a lady had a very narrow escape.

Destruction of a Theatre by Fire.—The fine Theatre of Santiago has been burnt. Two thousand persons had just retired from hearing Madame Carlotta Patti, otherwise the results might have been frightful. The fire broke out on the stage, by the incautious ignition of gas accumulated below. Three *employés* and an officer of the salvage corps lost their lives. The building cost half a million dollars, and was not insured, no company being willing to insure it.

Art in Liverpool.—The want of an exhibition of pictures in Liverpool is becoming felt, and is being commented on. What has become of the admirable determination of the town council to erect a building and form a permanent gallery of fine art in Liverpool?

Newcastle-upon-Tyne Chemical Society. A report of the proceedings at the ordinary meeting of this society, on December 22nd, has been printed. It contains an inaugural address by the president, Mr. John Glover, on various subjects, but especially on the importance of solving the sewage problem. After drawing the attention of chemists to this and other useful subjects, and to the pursuit of science for its own sake, Mr. Glover concluded his address by saying,—

"I believe that such of you as devote yourselves to purely scientific investigation, from the promptings of a pure and devoted love, may not, as your reward, gain material wealth, but you will have formed, what is of infinitely greater value, a noble character, and a capacity for enjoyment which mere wealth cannot give."

This address is followed up by a report of a paper "On the Manufacture of Copper on the Tyne," by Mr. R. C. Clapham.

A Mortuary for Central London.—Last week a special meeting of the Strand District Board of Works was held to consider a notice of motion by Dr. Joseph Rogers to the following effect:—"That, with the view to the prevention of disease, and in the interest of the health, convenience, and comfort of the poorer classes, it is desirable that a mortuary house, similar in character to that which has been in existence in the parish of St. Anne, Westminster, for many years, should be constructed, either in each parish, or a central one only for the use of the whole of the other parishes of the district." After a long discussion, the motion was carried by a majority of nineteen to two.

The Government and the Drainage of Towns.—At the last meeting of the Windsor Local Board of Health, the clerk read a letter from the Local Government Act officer, Whitehall, in which it is said, on the part of Mr. Bruce,—"It is generally expected that some legislation affecting the whole kingdom, in relation to local improvement, of which town sewerage must form an important element, will be the result of the report of the Sanitary Commission; but that report has not been sent in, or, if sent in, has not yet reached this department."

Lambeth School of Art Concert.—The students of the Lambeth School of Art, on Friday evening, the 27th ult., gave, at the Vestry-hall, an amateur concert. Twenty ladies and gentlemen, students, formed the chorus, and, with the assistance of two or three relatives and friends of the members, took the entire labour of rendering high-class music. It is to be hoped that the effort now being made to enlarge the present small and ill-provided buildings will meet with efficient support.

The Purchase of Hampstead Heath.—In the annual report of the Hampstead vestry, just issued, satisfaction is expressed at the agreement that has been come to between the Metropolitan Board of Works and Sir John Maryon Wilson and his eldest son for the purchase by the Board of Hampstead Heath. The sum to be paid is 45,000*l.*, which is to be raised by a loan, and will be payable by instalments extending over sixty years, and chargeable on the rates of the whole metropolis.

Architectural Association.—A course of lectures on "Limes and Cements," is about to be delivered by Lieut.-Colonel Scott, R.E. The first, on Monday evening, February 6th, will treat of the present state of knowledge, the composition of calcareous minerals, their origin, the chemical properties of the substances composing them, and their action under the various conditions of the preparation of limes and cements, and of their employment in mortar.

A New Road Material.—The extension of the use of iron slag in making and repairing roads is talked of. The trial of two years since in Park-street and Grosvenor-square has been considered by the vestry of St. George's, Hanover-square, to be satisfactory enough to induce them to decide on extending its use; and the St. Pancras vestry intend also to make use of it for the repair of roads, and have accepted a tender by Mr. Coulthard, of Westminster, C.E., for a supply.

Effect of Cold on Iron and Steel.—A series of interesting papers have been read before the Manchester Literary and Philosophical Society, bearing upon the question of the effect of intense cold upon the strength of iron and steel, and the results show that the cold has no appreciable effect, and that it certainly does not diminish the strength of the iron.

A Provision against Panics.—A special town council meeting was held at Liverpool on Wednesday last to consider the Improvement Bill, when a special committee was appointed to consider the advisability of inserting a clause to empower the corporation to compel the adoption at all places of public resort (including churches and chapels) of ample means of ingress and egress.

The Tay Bridge.—The *Dundee Advertiser* hears that the entire sum which Mr. Stirling, the chairman of the North British Railway Company, stated should be subscribed before the contracts for the Tay Bridge were entered into, has now been raised, and that a meeting of the Tay Bridge Committee will be held on an early day.

Society of Engineers.—The first ordinary meeting of the society for the present year will be held on Monday evening, the 6th inst., in the society's hall, Westminster Palace Hotel, when the premiums awarded for papers read during the year 1870 will be presented, and the president for 1871 will deliver his inaugural address.

The Disposal of Sewage.—The Richmond Select Vestry having applied to the Home Secretary for permission to raise a loan for the purchase of 224 acres of land on the Blagden Lodge Estate, situate in the parishes of Few Malden, Kingston-on-Thames, and Merton, for the purpose of utilising the sewage of Richmond.

A Health Class at the Oxford University. The Regius Professor of Medicine (Dr. Acland) proposes to form a class for the practical study of the requisites for personal and public health. In connexion with the class, instruction will be given at the Museum by Mr. C. C. Poole, M.D., of Exeter College.

Smithfield.—According to the *City Press*, the London Joint Stock Bank has secured for their Clerkenwell and Smithfield Branch the site at the corner of St. John-street and Charterhouse-lane, opposite the central avenue of the Metropolitan Meat Market. The plot contains nearly 3,000 superficial feet.

TENDERS.

For additional buildings to the South Metropolitan District Schools, Sutton, Surrey. Mr. W. Wallen, architect:—

Gammon	£36,307	0	0
Martin	36,100	0	0
Polland	35,650	0	0
Tarrant	35,070	0	0
Higgs	34,700	0	0
Manley & Rogers	34,677	0	0
Crockett	33,390	0	0
Newman & Mann	32,736	0	0
Blackmore & Morley	32,408	0	0
Myers	32,357	0	0
Markwick & Co.	32,300	0	0
Thorn & Co.	32,000	0	0
Henshaw	31,834	0	0
Mann	31,765	0	0
Perry	31,587	0	0
Caps & Ritso	31,290	0	0
George	31,079	0	0
Stiff	30,875	0	0
Crabbe & Vaughan	30,600	0	0
Hart (accepted)	29,324	0	0
Wood	27,762	0	0

For two new warehouses adjoining the King and Queen Granary, Rotherhithe, for Mr. T. D. Barnett. Messrs. Tolley & Dale, architects:—

Conder (accepted)	£6,346	0	0

For rebuilding two houses and shops at Reading, for Mr. Richard Attenborough. Messrs. W. & J. T. Brown, architects:—

Matthews	£1,649	0	0
Wheeler, Bros.	1,600	0	0
Sheppard	1,549	0	0
Woodruffe	1,530	0	0
Barnicoat	1,500	0	0
East	1,473	6	6

For restoring the Assembly-rooms, Reading, partially destroyed by fire, and converting same into theatre and concert-hall (exclusive of stage and decorations). Messrs. W. & J. T. Brown, architects:—

Woodruffe	£2,350	0	0
Sheppard	2,110	0	0
Matthews	2,100	0	0
Barnicoat	2,085	0	0
Grover	1,940	0	0

For Langford Schools, near Biggleswade. Mr. John Norton, architect:—

Nightingale	£742	0	0
Gale	655	0	0
Field	634	0	0
Twelvetrees	633	0	0
Cooke & Green	625	0	0
Wright, Bros., & Goodchild	625	0	0
T. Taylor	608	0	0
Gaul	603	0	0
Redhouse	600	0	0
G. Taylor	589	0	0
Foster	535	0	0

For alterations and additions to Blunham House, Beds, the residence of Sir S. G. Payne, bart. Mr. John Usher, architect, Bedford. Quantities supplied:—

Fletcher	£3,140	0	0
Moore	2,769	0	0
Hutchinson	2,596	0	0
Twelvetrees	2,558	0	0
Cunvin	2,556	0	0
Freshwater	2,550	0	0
Carter	2,435	7	0
Wildman & Edey	2,420	0	0
Young	2,327	0	0
Hull	2,176	10	0
Spencer	2,139	0	0
Vickers	2,119	10	0
Foster (accepted)	1,999	0	0

For new Wesleyan Chapel, Mansfield-road, Nottingham. Mr. T. Simpson, architect:—

Slim (accepted)	£3,254	0	0

For the erection of the Lock, Itch, and Skin Diseases Wards, Nottingham:—

Marriott & Co.	£3,190	0	0
Claricoat	3,154	0	0
Dennett	3,145	0	0
Ward	3,081	15	0
Meeson	2,989	0	0
G. Bell & Son	2,979	0	0
Underwood	2,970	0	0
Jelley	2,955	10	0
Barker	2,900	0	0
Middleton	2,900	0	0
Stevenson & Weston	2,900	0	0
Wool & Slight	2,890	0	0
Lynham	2,890	0	0
Wood & Son	2,861	0	0
Fish	2,845	0	0
Vickers	2,840	0	0
Slim (accepted)	2,826	0	0

For stabling, loose boxes, and sheds, to be erected at Brunswick-street, Poplar, for the London General Omnibus Company, Limited, under the superintendence of Mr. P. Tosh. Quantities supplied by Mr. A. J. Bolton:—

Brown & Son	£3,600	0	0
Rutter	3,500	0	0
Bradley	3,345	10	0
Faulkner	3,293	0	0
Potter	3,283	0	0
Wilson	3,250	0	0
Harrison	3,050	0	0
Cowley	3,050	0	0
Rivett	2,992	0	0
Thompson	2,980	0	0
Wright	2,975	0	0
Preeble	2,958	0	0
Abrahams	2,923	0	0
Beeton	2,881	0	0
Sheppard	2,878	0	0
Wallinson & Co.	2,869	0	0
Nightingale	2,869	0	0
Turrill	2,849	0	0
Winship	2,849	0	0
Flint	2,839	0	0
Eaton & Chapman	2,812	0	0
Blackmore & Morley	2,805	0	0
Crabb & Vaughan	2,800	0	0
Capps & Ritso	2,798	0	0
Garrard	2,793	0	0
Merrion	2,787	0	0
Lacey	2,750	0	0
Wicks, Bangs, & Co.	2,689	0	0
Croutt	2,650	0	0
Langmead & Way	2,650	0	0
Cook & Green	2,645	0	0
Harris	2,597	0	0
Ennor	2,587	0	0
Hugheadon	2,570	0	0
Stevenson	2,555	0	0
Ford	2,498	0	0
Mann	2,433	0	0
Bleese	2,355	0	0
Jorry	2,319	10	0

For alterations at Avening House, near Stroud, for Mr. Edmund Kimber. Mr. W. Clissold, architect:—

Drew	£2,441	0	0
Harrison	2,310	0	0
Wall & Hook (accepted)	2,198	0	0

For erection of bailiff's house, at the Priory, Woodchester, for Mrs. H. D. Cholmeley. Mr. W. Clissold, architect:—

Workman	£214	0	0

For additions to premises, No. 67, Brompton-road, for Messrs. Wheeler & Pearce. Mr. F. A. Dovey, architect:—

Morsman	£820	0	0
Kelly, Brothers	698	10	0
R. H. Taylor	705	0	0
Hearle	668	0	0
D. Taylor	524	10	0

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J. J.—R.—J. H. G.—W.—F. W. P.—A. B.—Messrs. B.—D. M.—T. & D.—G. S. B.—H. L.—C. J. P.—T. W.—E. D.—F. S.—B.—W. S.—J. N.—J. U.—G. L. T. B.—M. F.—G. B. C.—J. B.—B.—S.—E. F. H.—A. J. D—E. H. M.—F. & J.—Captain P.—W. C.—W. B. (more assertion goes for nothing. If you have any information to give, give it).—T. S. (we cannot interfere. Write again).—H. H. (enough has been said on so small a matter).—N. E. S. (the School Board will doubtless appoint an architect, but we do not hear that they have as yet formally invited applications).—M. (there are modes independent of steam. Call in proper advice).—G. A. (next week).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

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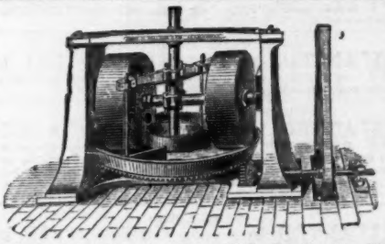

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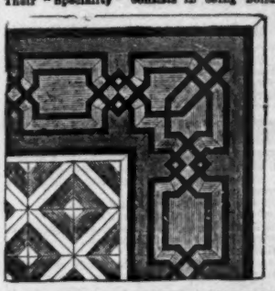

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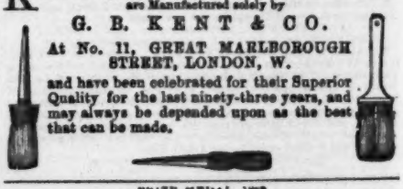

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